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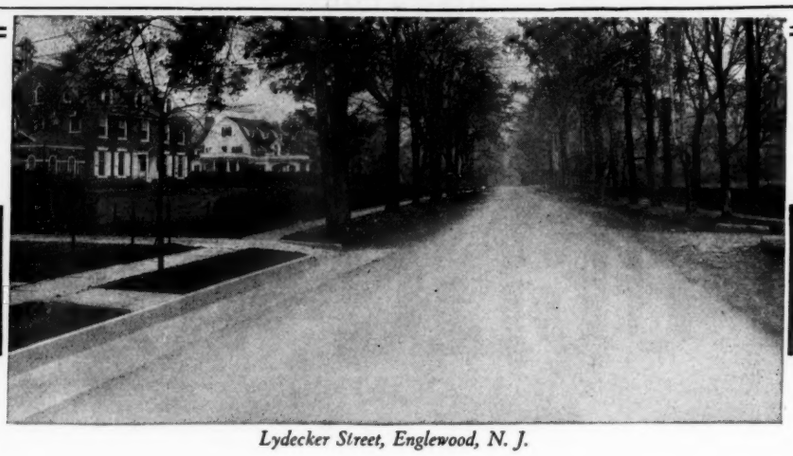

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PRESERVING SHADE TREES.

A few weeks ago we commented upon the loss to the community that sometimes has resulted from a too rigid adherence to standard street plans, whereby grown shade trees were cut down which could have been saved by a modification of the plan that would not have interfered with the convenient and proper use of the street. In this issue we give a summary of the legal discussions bearing upon the mutual rights and powers of cities and citizens with respect to shade trees.

These decisions show in general, that a citizen may obtain an injunction to prevent the destruction of shade trees in public streets by municipal authorities, and requiring the officials to show that such destruction is for the public good; but that the courts are inclined to require pretty positive proof that the judgment of the officials is at fault before deciding against them.

When we consider that the appearance of a street or of an entire city can be ruined for a generation by the arbitrary acts of a city official covering only a few days or weeks, and that much harm can be done even before an injunction can be obtained against an unanticipated tree-slaughtering campaign, it seems as though city charters should contain some protection for trees, such as requiring a public hearing before an official can destroy any tree within city limits.

PUBLIC CONTROL OF WATER.

Water companies and departments have appealed to consumers from time to time to restrict consumption in order to avert a water famine in the city, and meters are used largely to prevent waste; but we believe it is something new to impose a penalty for excessive consumption. As told last week, Jersey City, N. J., has been fined by the state $22,285 for using from the Rockaway river more than the 100 gallons per day per capita which had been allotted to it.

The right of state or federal government to guard the quality of river waters has been recognized and become familiar, and western states have long controlled the amount that could be withdrawn for irrigation; but limiting the amount that cities can use for their public supplies is a novelty. There is every reason, however, why power to limit the amount that can be used should rest in a central authority and be exercised on occasion. No one city has a right to monopolize a water supply because it "saw it first." The water flowing in the rivers of a country comprises the run-off from every square foot of land in that country; and as the entire area yielded it, the entire area has a right in it. Moreover, to permit one or

a few cities to monopolize all the water available in a state would be fatal to the growth in population and industrial development of the state outside of such cities.

The New Jersey plan seems to be a rational one and one that all states must adopt in some form, sooner or later; and the sooner, the less will be the confusion and individual hardship and the greater the benefit resulting therefrom.

SHADE TREES IN STREETS

By JOHN SIMPSON.

City Authorities Possess Broad Powers for Removal of Trees, If in Their Judgment Such Removal Is of Public Benefit—Conditions Under Which Citizens Can Obtain Injunction—Court Decisions.

Where the fee in the street is vested in the city authorities, an individual acquires no such personal right in the preservation of shade trees standing thereon as would enable him to interfere, by injunction, with the city authorities in the exercise of a discretionary power of removing such trees as obstructions upon the public streets. He has the right to the maintenance of the street as a public highway, unobstructed, but he has no legal right to the continuance in the street of a shade tree after the city authorities have concluded to remove it as an obstruction. In such cases the control of the streets by the city authorities is absolute.—City of Atlanta v. Holliday (1895) 96 Ga. 546. Castleberry v. City of Atlanta (1884) 74 Ga. 164.

And it has been held that if the municipality owns the fee in the street, no recovery of compensation can be had by an abutting owner for the removal of shade trees in front of his premises. Gaylord v. King (1886) 142 Mass. 495. But, in Lovejoy v. Campbell (1902) 16 S. Dak. 231, 236, the court said that it saw no reason why substantially the rule that, where the fee to the highway is in the abutting owner, he is entitled to damages if the trees thereon are cut or injured otherwise than is necessary for making or repairing the highway, should not prevail even when the fee is in the city or town, where the abutting owner at his own expense, and with the express or implied consent of the municipal authorities, plants and cares for shade trees along the streets adjoining his property; but that where they were planted and are cared for by the municipal authorities, the abutting owner should not be entitled to recover for injuries to them under any circumstances.

The case is different, however, where the fee to that portion of the street and sidewalks occupied by the trees is vested in the abutting owners. Such trees are the private property of the lot owners, held, however, subject to the exercise by the city, by appropriate proceedings, of its right to extend its dominant easement over the ground occupied by them, whenever, in the judgment of the city authorities, it becomes necessary for the public necessity or convenience that this be done. But to justify such an act, there must be a public necessity. Private property may not be taken for public uses upon mere considerations of public conveniences. The public convenience which will justify such a proceeding must amount to a public necessity. Whether a case of public necessity arises is a matter primarily for determination by the city authorities. If they exercise a wise descretion in the matter, the courts are without power to control them. Atlanta v. Holliday (1895), 96 Ga. 546, 555.

So the courts will not interfere where the facts show that the trees were in the center of the sidewalk and a serious obstruction to travel. Vanderhurst **v.** Tholcke, (1896) 113 Cal. 147; Tate v. Greensboro (1894) 114 N. Car. 392. Chase v. Oshkosh (1892) 81 Wis. 313. Or that their removal is necessary in the construction of a public improvement. Mt. Carmel v. Shaw (1895) 155 Ill. 37: Hildrup v. Windfall City (1902) 29 Ind. App. 594; Gallahen v. Jefferson (1904) 125 Iowa 324; Wilson v. Simmons (1896) 89 Me. 242.

In Chase v. Oshkosh, the court said that there could be no doubt but that the city would have been liable in damages to any person traveling along the sidewalk in the night-time who, without fault on his part, had been injured by running against these trees situated within the limits of the walk. It appeared they stood from eight to fifteen inches within the curb.

But a city may not capriciously remove such trees when it palpably appears that no such necessity exists, and that the public convenience will not thereby be subserved; and to prevent the perpetration of such a wrong, an injunction will lie at the instance of the lot owners. Atlanta v. Holliday (1895) 96 Ga. 546; Remington v. Walthall (1910) 82 Kan. 234, 108 Pac. 112; Easton v. Turner (1912) 117 Md. 111, 83 Atl. 42; Webb v. Strobach (1910) 143 Mo. App. 459, 127 S. W. 680; Paola v. Wentz (108) 79 Kan. 148; Kemp v. Des Moines (1904) 125 Iowa 644.

So, injunction was granted to restrain the removal of trees which were so situated as not to amount in any sense to an obstruction of the public highway. They were situated in a narrow vacant space between the outer curbing of the driveway of the street and the outer curbing of the sidewalk. Moreover, along this street there has been placed a great many telephone, telegraph and trolley-poles; and the proposition was to remove these trees upon the ground of public necessity as obstructions to travel, and to permit the poles mentioned to remain. In other words, a shade tree was regarded as an obstruction, when a bare pole, not quite so large in circumference as the shade trees, but very much less ornamental, was not regarded as an obstruction to travel. Doubtless this paradox found lodgment in the judicial mind; and when the circuit judge came to inquire as to what motive influenced the public authorities to their action in the premises, he concluded that there was no public necessity for the removal of these trees; that the measure was purely arbitrary, hurtful to the citizen, and with no corresponding advantage to the public. And this view the Georgia Supreme Court held justified by the evidence, and affirmed judgment granting injunction. Atlanta v. Holliday (1895) 96 Ga. 546.

It should be noted, however, that in a more recent case, Town of La Grange v. Overstreet, (1910) 141 Ky. 43, where the court approved an ordinance directing the removal of a locust tree from a sidewalk, taking judicial notice of the fact that locust trees do not make desirable or attractive shade trees, the court said, in answer to the argument as to letting poles remain in streets while trees were removed: "The conditions in many towns and cities make it necessary, or at least advisable, that these poles should be removed from the streets, while in other places their location on the streets is not a matter of much consequence. But the mere fact that the board of trustees permit these poles in the

town of LaGrange to remain in the street is not a good reason why they should be denied the right to remove this tree from the sidewalk. And here again the question of descretion lodged in municipal boards comes into notice."

It seems clear that shade trees in streets are not a nuisance *per se*, and that municipal authorities cannot remove them by merely declaring them to be a nuisance as obstructing public travel when in fact they do not in any way interfere with the public use of the highway. Burget v. Greenfield (1903) 120 Iowa 432; Everett v. Council Bluffs (1877) 46 Iowa 66; Frostburg v. Vineland (1904) 38 Md. 239; Sprowl v. Stockton (1905) 73 N. J. L. 158; Allegheny v. Zimmerman (1880) 95 Va. St. 287.

As to whether the abutting owner should have notice that public necessity calls for the removal of the trees, and be given an opportunity to transplant or remove them, the authorities are not harmonious. In Stretch v. Cassopolis (1900), 125 Mich., 167; Clark v. Dasso (1876), 34 Mich., 86, and Sproul v. Stockton (1905), 73 N. J. L., 158, it is held notice must be given. To the contrary are Rosenthal v. Goldsboro (1908), 149 N. C., 128, and Chase v. Oshkosh (1892), 81 Wis., 313; but it is to be noted that in the latter case the abutting owner had been actually previously notified to remove the trees.

In Robinson v. City of Spokane (1912), 66 Wash., 527; 120 Pac., 101, the court states what it considers to be the correct rule as follows: When, in undertaking a public improvement or for the purpose of abating a nuisance, it becomes necessary to remove shade trees from a city's streets or sidewalks, the municipal authorities are vested with the power to direct the removal of such trees, notwithstanding the objection of an abutting owner whose interests may suffer thereby. The following cases support this rule: Mt. Carmel v. Shaw (1895), 155 Ill., 37; Hildrup v. Windfall City (1902), 29 Ind. App. 594, 64 N. E., 942; Gallagher v. Jefferson (1904), 125 Iowa, 324, 101 N. W., 124; Kemp v. Des Moines (1904), 125 Iowa, 644, 101 N. W., 474; Landry v. Lake Charles (1910), 125 La., 210, 51 So., 120; Colston v. St. Joseph (1906), 106 Mo. App., 714, 80 S. W., 590; Morris v. Salt Lake City, 35 Utah, 474, 101 Pac., 373. When it appears that the city's action is not wanton or unreasonable, and that the trees stand in the way of the completed improvement, or interfere with the use of the street, the abutting owner cannot prevent their removal. Easton v. Turner (1912, 117 Md., 111, 83 Atl., 42; Jeffries v. Greenville (1911), 154 N. C., 490, 70 S. E., 919; Gianque v. Salt Lake City, Utah (1912), 129 Pac., 429. In St. Mary of the Angels Church v. Barrows (1910), 68 Misc. (N. Y.), 545, 124 N .Y. Supp., 571, the court said: "The law is well settled in the state of New York that the rights of the city in making authorized public improvements in the street with proper care and skill are paramount to the interest of an abutting owner in trees planted in the street, even though such abutter owns the fee of the street. This is true, although the trees may be injured, and although such injury might be avoided by the adoption of a different plan. The court cannot interfere with the discretionary powers of municipal authorities, and direct them to save shade trees by paving the street to a width of 20 feet rather than 30 feet, or by laying water pipes in the centre of the street rather than in the subway, or by dictating that they shall injure the pavement rather than the shade trees. If detriment to the trees of the abutter results from the adoption of such a plan of improvement in the street by proper corporate action, the case is one of *damnum absque injuria*."

How far courts can or ought to interfere with a municipality which, in grading or paving a street, is about to destroy or seriously injure shade trees on the sidewalk of an abutting owner, is a question of some delicacy, and not always easily determined so as to avoid doing injury either to the public or to such owner. Easton v. Turner (1912) 117 Md. 111, 83 Atl. 42. In Jeffries v. Greenville, supra, for example, the court said: "We would hesitate to interfere with the exercise of the sound judgment of those who have the matter in their charge, except in an extreme case indicating bad faith, malice, or wantonness, for they are trustees of the public and as such vested with a very large discretion, as we have shown; but they should discharge their duty to the public with as little injury to the citizen as is possible under the circumstances." In Rosenthal v. Goldsboro (1908) 149 N. Car. 128, it was held to be within the power of municipal authorities to remove shade trees from the streets of a city where their roots have penetrated into sewers and obstructed the city sewerage ; and so long as the authorities act in good faith, and neither wantonly nor maliciously, the courts will not interfere with the exercise of their discretion in the matter. Whatever damage results to the abutting owner in such a case is *damnum absque injuria*, and furnishes no ground for pecuniary compensation or injunctive relief.

Ordinances are frequently passed giving municipal authorities power to remove shade trees from streets. In construing these the courts will look not only to the discretion vested in those intrusted with the carrying out of the ordinance provisions, but also to the reasonableness or otherwise of the ordinance. Where such an ordinance results in the arbitrary and unnecessary destruction of shade trees, the court will declare it unreasonable and will restrain any action thereunder. Webb v. Strobach, (1910) 143 Mo. App. 439.

In the case of LaGrange v. Overstreet, (1910) 141 Ky. 43, to which reference has already been made, the court, approving an ordinance directing the removal of a locust tree principally on the ground that it was not a desirable shade tree, said: "Shade trees add a great deal to the beauty and comfort of towns and cities. The inhabitants are encouraged to set them out, care for and protect them, and in nearly every town ordinances have been enacted looking to their safety. And so we doubt if the board of trustees in any town in the state would be so indifferent to or reckless of the wishes and civic spirit of the community as to order the removal of suitable and attractive shade trees from the streets or sidewalks, if they were so located as to leave room for convenient travel, unless there was other good reason for taking such action."

In Pennsylvania it has been held, Gitt v. Hanover, (1895) 4 Pa. Dist. Ct. 606, that a municipal ordinance authorizing the removal of a certain tree in a city street is special legislation and therefore void.

FEDERAL AID ROAD WORK

Roads estimated to cost $15,120,771 and having a combined mileage of 750.87 were approved for Federal aid during May, the amount of such aid to be $6,382,081.28. These are covered by 124 projects, the largest number approved by the Department of Agriculture since the passage of the Federal Aid Road Act.

During the month there were executed by the secretary and the several state highway departments, 81 project agreements, involving the improvement of 667.71 miles of road at a total estimated cost of $7,992,867.25, and on

which $3,570,087.22 Federal aid was requested and set aside in the Treasury. In addition, agreements to cover 59 other projects were placed in process of execution during the month.

Up to and including May 31, 1919, project statements or 1,188 projects had been approved. The 1,188 projects involve 11,350.10 miles of road, a total estimated cost of $108,295,329.15, and a total of $43,076,176.63 Federal aid. On the same date 617 project agreements had been executed, involving 5,291.86 miles of road, at a total estimated cost of $47,426,749.49, of which $19,521,259.27 was from Federal funds.

In connection with the project to create a federal highway commission to have supervision of the country's highways, secretary Houston has expressed himself as opposed to it, saying: "I am convinced that nothing material would be gained. Much would be lost. . . . The creation of a commission would entail unnecessary additional administrative expenditures, and the commission could not do anything that cannot now be done more effectively by the existing co-operative machinery. . . . I believe that many of those who are backing the proposed change do not know the facts and are not aware of existing conditions and possibilities. I believe also that their proposal stands very little chance of being enacted into law."

SUGGESTIONS FOR CONCRETE PAVEMENT CONSTRUCTION

Detail Plans of Strike Boards, Joint Boards, Roller, Belt, Floats and Other Appliances Used—Various Procedures of Construction—Features That Should Receive Special Attention of Inspectors.

As a result of his experience on concrete road construction in the southwest, Clyde E. Learned, highway engineer of the Bureau of Public Roads, has prepared for the bureau certain suggestions for inspection and construction of such roads that contain a number of features not found in ordinary practice. The more important of these are given herewith.

MATERIALS.

As all cement usually is tested before shipment, the field engineer should receive copies of these tests, together with car number and amount shipped. This information should be filed for ready reference, and as the cement cars arrive, the engineer or inspector should break the car seals and remove the shipping cards, which should be checked with the original shipping notification.

It is essential to insure that the sand used is of as good a quality as the sample by which the source of supply was selected. This requires field tests, which should include,

1. Visual inspection, this being to a great extent dependent upon the training and experience of the individual who makes the inspection.

2. Grade by means of a set of portable sieves.

3. Test for cleanness, made by the volumetric method. Shake a small sample of the sand to be tested in an excess of water in a bottle or measuring glass, allowing any suspended matter to settle on top of the sand. This test will reveal the presence of clay or loam, but does not indicate the proportion in which these materials are present in the sand.

4. Test for organic impurities. Place 4½ ounces of a sand which is to be tested in a 12-ounce graduated bottle and add enough of the 3 per cent solution of caustic soda to fill the bottle to the 7-ounce mark. Shake well and then let stand over night. If the color of the solution becomes dark red to black, the sand contains so much organic material that it should be accepted only after very careful mortar strength tests.

If gravel is used, watch it for coated material and clay lumps. Test the water used for alkalinity or acidity by means of litmus paper. The apparatus for field tests includes a set of portable sand sieves, one of portable stone screens from 2½-inch to ¼-inch, a 250 c.c. graduated glass beaker, six 12 oz. bottles, wide mouth, a set of balances, a quart of 3 per cent solution of caustic soda, a 32 oz. bottle, wide mouth, and an engineer's scale.

CONSTRUCTION.

If the contractor uses sand or other material to fill up slight depressions in the subgrade, be sure that all such material is well tamped. The total width of the pavement should be uniformly compacted; there should never be a pervious mat of sand or similar material on one side of the road and impervious material such as clay on the other, for this will cause unequal settlement and possibly longitudinal cracks.

See that subgrade is rolled properly and no traffic allowed on it after rolling; then it will be unnecessary to keep grading men at work just ahead of the concreting. Before placing concrete on the subgrade it should be well wet down, this generally requiring from ½ gallon per square yard for clay to 1½ gallons for sand.

See that the concrete is in the mixer drum for at least a minute. Prevent use of excess of water—30 to 35 gallons per cubic yard of 1:2:4 concrete is sufficient. If the concrete is not mixed enough or too much water is used in it, it will not appear uniform as it comes from the mixer. If a chute is used for distributing the concrete, a fairly steep slope is necessary, otherwise more water must be used in the concrete than is desirable for securing sound concrete. If a boom and bottom-dump bucket are used, see that the latter does not leak so as to allow mortar to escape.

Have the strike-board, joint-installing board, roller and finishing belt kept clean.

Break in the strike-board men to use care in screeding at the joints, to be sure that all excess concrete is removed, and that no low places are left at the joints. A smooth-riding surface depends more upon the striking off than upon any other operation.

Work the concrete mixer uphill when feasible, as smoother joints are thereby obtained. Use a notched straightedge straddling the joints to determine if there are any high or low points on either side.

When a sidewalk edging tool is used at the expansion joint, be sure that the concrete has first taken a slight set and that a good, clean, rounded edge is secured.

Expansion Joints.—Have the strips of jointing material kept flat before use; if scattered around, they get kinks in them which it is difficult to remove and which may appear later in the concrete. Use care in setting these strips, for crooked joints in a pavement are very unsightly.

Joint strips can be installed with very satisfactory results in the following way: A joint board is made of a 2-inch surfaced plank about 2 inches wider than the thickness of the pavement and 1 inch shorter than its width and provided with handles at both ends. (See Fig. 1.) This board is held in place on the subgrade by two or three iron pins driven behind it, and the joint strips are placed flat against the board. A few shovelfuls of concrete are placed against the strips to hold them in place until the pavement has reached that point. As soon as enough concrete has been dumped in front of

the joint board to fill the block, work is started on a new block by dumping concrete on the other side of the joint board.

When ready to use the strike board on the new block, remove the iron pins and withdraw the joint board slowly, leaving the asphalt strip in place. In withdrawing the board, the top of it is tipped away from the strip, to prevent the two from adhering together, and the board is then worked slowly up and down, thus "pumping" concrete against the strip. The joint board is then lifted slowly at one end until it is entirely out of the concrete, concrete being pushed meantime into the opening left by the board. The strike board is then placed against the projecting part of the strip on the mixer side, a few shovelfuls of concrete are placed in front of it to make up for the removal of the joint board, and striking is begun.

A metal strip can be used in place of a joint board, and offers the advantage of leaving a smaller space when withdrawn; but this is more than offset by its liability to be bent by rough handling.

Before the pavement is thrown open for use, the joint filler should be cut to a uniform height by means of a square-pointed shovel shod with two steel runners riveted to the under side of the blade, which is notched and provided with a sharp cutting edge. Enough of the strip should be left protruding to fill the depression caused by the use of the edging tool, and should be ironed out by use of a heavy asphalt smoothing iron, heated.

A split float should be used on all joints, without any exception and in spite of any protest by the finisher. It is well to round off the edges of the pavement with a sidewalk edging tool. Metal floats produce too smooth a surface and their use should be absolutely forbidden.

The finished surface should be tested with a 10-foot straight edge laid parallel to the center line of the road, and there should not be a variation by over ¼ of an inch in the surface over this length, and where variations do occur they should be gradual.

Striking Off.—The strike board or screed is built from 3 to 4 inches wide and about 12 inches high. Its length should be about 2 feet greater than the width of the pavement, and it should be shod on the finishing edge with an iron strap from ¼ to ½ inch in thickness (see Fig. 1). It should have a crown about one-quarter of an inch greater than the crown of the pavement, in order to allow for deflections when it is used as a tamper. Substantial handles should be attached at each end of the strike board.

The following method is used for striking off and tamping the pavement surface: Have the spreaders keep a small wave about one inch high in front of the strike board the first time over, making sure that no daylight appears between the concrete and the board. The first time over, advance the strike board with a combined longitudinal and crosswise motion, this first passage leaving the surface a series of small transverse waves with a slight excess of concrete. Sometimes when too much concrete is deposited in front of the board it is necessary to first pull the concrete down to an approximate surface by means of the strike board, this being performed by a straight pull ahead on the board. On the second or return passage the board is used as a tamper to compact the surface, this being performed as follows:

One of the strike board men holds his end of the board on the side form, while the other tamps the concrete by a succession of short, quick up and down strokes, at the same time advancing his end about 2 or 3 inches each stroke, the total advance being three or four feet. This operation is then repeated by the other strike board man moving his end ahead, while the first man pivots his end on the side form. In this manner the entire surface is tamped, each man covering a series of fan-shaped sections. This tamping fills all pockets and pushes down all protruding stones. The strike board is then passed over the surface using the same motion of the strike board as in the first passage over the slab, and making sure that, during this passage, it rests on the side forms at all times.

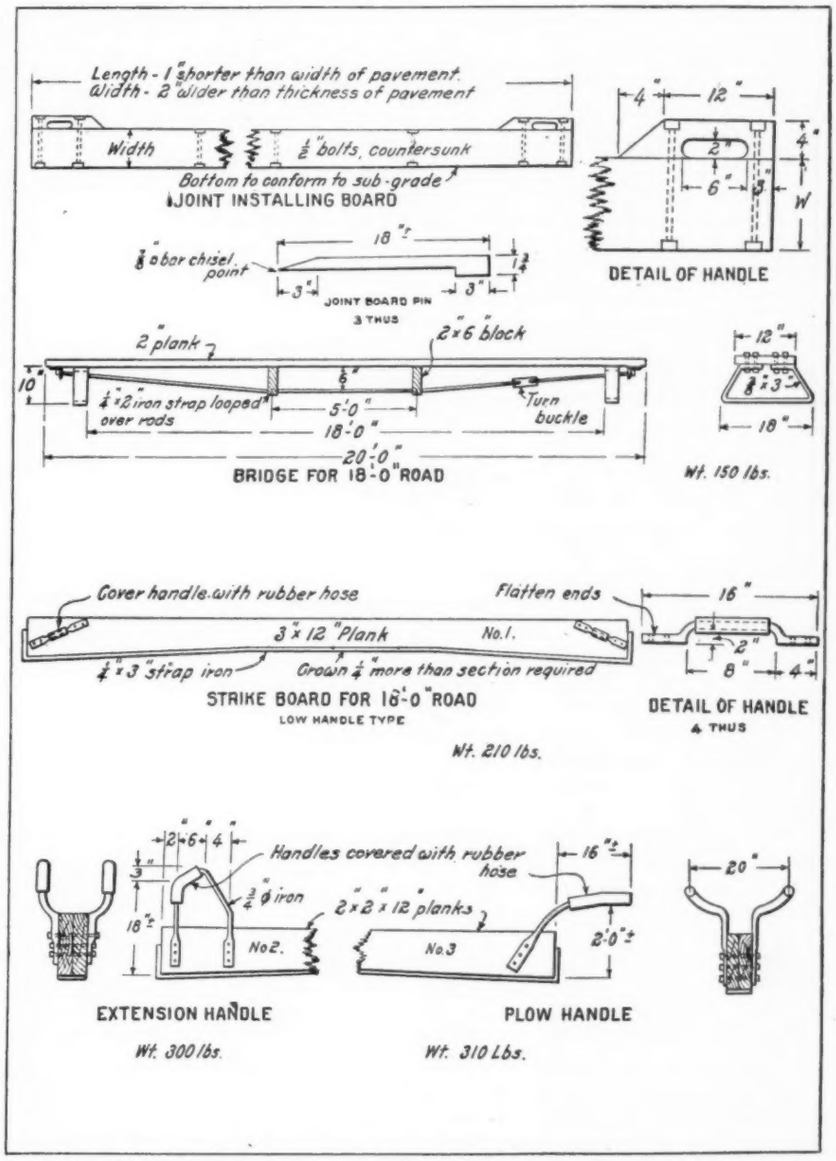


FIG. 1—TOOLS USED IN THE CONSTRUCTION OF CONCRETE PAVEMENTS.

It is sometimes necessary to pass the strike board over the surface four or five times in order to get the desired results, but ordinarily the three passages above described are sufficient.

Rolling.—After striking off the pavement it should be rolled. This is done with a roller 10 to 12 inches in diameter, about 6 feet long, and weighing about 1 pound for each inch in length. The roller is provided with a long handle which enables the operator to reach across the pavement. In rolling, roller is advanced about 2 feet for each complete passage (see Fig. 2.) Do not use the roller too soon after striking off the pavement, as this tends to flatten the crown. The proper time varies from one-half hour to two hours after the concrete is placed. The roller facilitates the use of the finishing belt, especially where crushed stone is used, as it pushes down the sharp projecting edges and corners. It is possible to use the roller much sooner where crushed stone is used than where gravel is used.

The roller often causes longitudinal waves adjacent to the side forms at the end of each crossing. These should be eliminated with a hand float before the application of the finishing belt. (See Fig. 2.)

(To be continued)

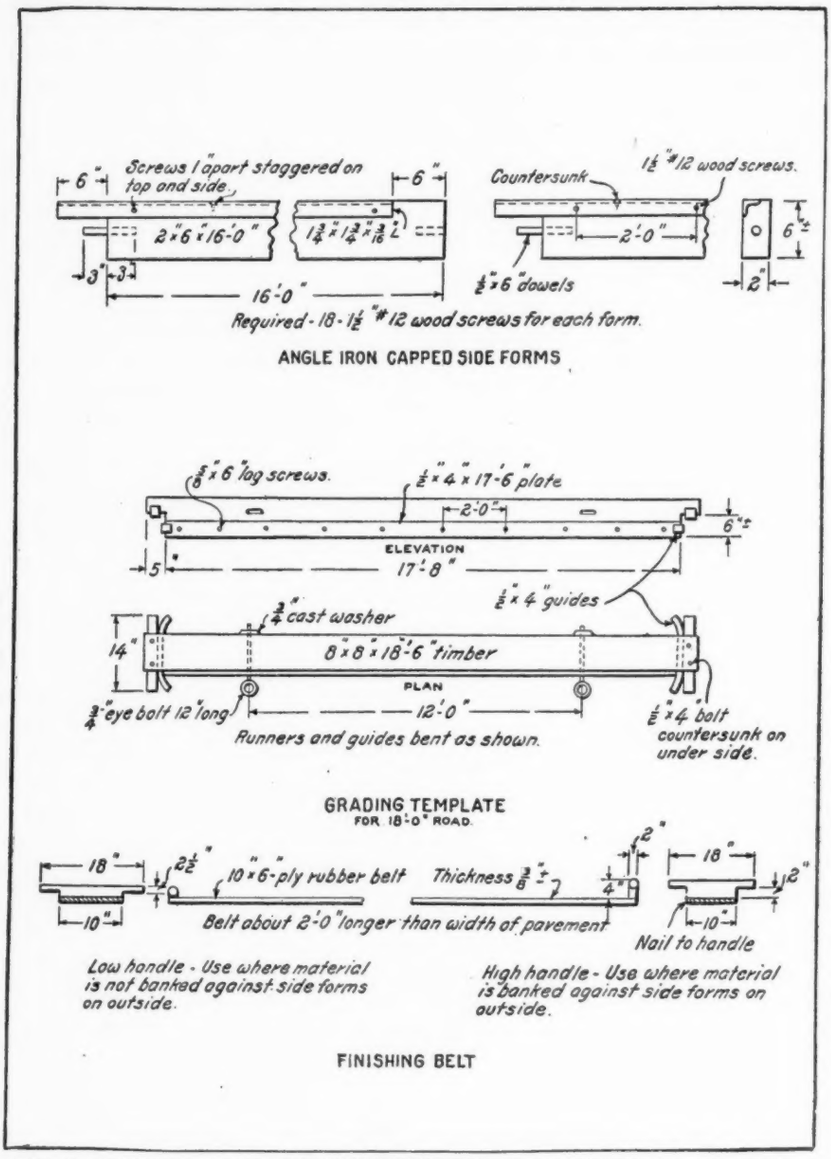


FIG. 2—TOOLS USED IN THE CONSTRUCTION OF CONCRETE PAVEMENTS.

RED COATS FOR RODMEN.

By W. A. HARDENBERGH.

During a large survey in North Carolina, which involved a considerable amount of topographical work by the stadia method in wooded country, the problem of finding the rodmen through the telescope was a very important one. The time spent in locating rodmen was costly (the party contained a transitman, a recorder, four rodmen and two axemen generally), while the distance at which the rod carriers could be discerned limited the amount of territory that could be surveyed from a given set-up, requiring additional set-ups.

Strange as it may seem, the major difficulty was not in reading the rod, once it was located, but in finding it through the thick brush in this mountainous area of the country. With practice, the red and white boldly painted rod could be read when only a small strip showed through the leaves and twigs. Waving the rod and similar devices were, of course, resorted to.

A solution of the problem was discovered by accident. One of the rodmen ordered through a mail-order house a light flannel coat for fall wear while working, the color being a brilliant scarlet. The superior ease with which he could be located while wearing this coat was astonishing. A little investigation showed that he was giving 20 per cent to 25 per cent more shots, at longer range, and with less time lost in locating than any other rodman, though, as a rodman, he was not by any means the best in the crew. His superiority was due entirely to the ease with which he could be seen.

Before the war these light flannel coats, with a large pocket on either side and a smaller one above, could be bought for about $2.50 to $3. They are peculiarly adapted for use by rodmen, or by other surveyors, by reason of their lightness, warmth and general handiness, and, when working on topographical (as stadia) surveying in wooded country, supplying them for the rodmen is economical, since they increase the efficiency of the men to such a great extent, approximately by 20 per cent, and thus pay for themsleves in only a week or two.

SMALL MUNICIPAL BLACKSMITH SHOP.

Until May 1st, 1918, Waltham, Mass. had 31 horses in its street department. At that time three trucks and a touring car were purchased and 10 of the horses sold. At about the same time a blacksmith shop was installed in the stable yard, the equipment costing about $600. Since then, all horses owned by the city (including several besides the 21 owned by the street department), have been shod in this shop and all the blacksmith work of all departments has been done there. The total number of horses shod between May 1st and January 31st, 1919, was 251, the cost of which was $794.33, making a saving

in the city's horse shoeing bill of 21 per cent. A saving was also made in other work done in the shop, on which the blacksmith was engaged for 883 hours during the nine months. The shoeing done comprised 800 plain shoes, 172 bar shoes, 12 neverslip shoes, and 21 drive calk shoes; in addition to which 122 rubber pads were applied, 174 leathers, and 216 shoes were reset.

The acting superintendent of streets, Henry F. Beal, is apparently satisfied that, even for a city as small as 32,000, a municipal blacksmith shop can be made a paying investment.

DISINFECTION OF WATER SUPPLIES

Data Concerning Use of Chlorine for Public Water Supplies—Incompleteness of Typhoid Statistics —Causes of Typhoid Other Than Water.

In the June 7th issue we quoted a number of opinions by waterworks officials in the various parts of the country concerning the effectiveness and desirability of the use of chlorine, either as hypochlorite or liquid chlorine. Something over one hundred officials sent information concerning their use of disinfectants, and the accompanying table shows the facts as presented by eighty-eight of them, the others not having kept records of the use of such material on which to draw for information.

We were somewhat surprised to learn from these replies of health department officials, how many of them had no records of typhoid cases or deaths. Certainly it would seem as though any state or local health board were very delinquent in its duty if it did not use its utmost endeavor to obtain all the information available concerning typhoid within the districts under their charge, and yet more than ten per cent of the health officers reporting to us admitted that they had no such records. Without evidence as to how much typhoid there is to combat, or figures to show for the encouragement of health officials that their efforts are resulting in a reduction of typhoid, any effort to eliminate the disease must be greatly handicapped.

While every state, we suppose, has laws requiring the reporting of every death and the cause thereof, and while these are very generally enforced with considerable success, regulations for reporting cases of disease like typhoid are either insufficient or insufficiently enforced in the majority of cities. This has been apparent to us for a number of years from reports inspected, but is emphasized by many of the figures secured by this questionnaire. In the majority of instances where it is known that all typhoid cases are reported, it is found that on an average about 90 per cent of the cases recover, while a southern physician and health officer has informed us that in southern districts, where physicians have had more experience with typhoid, the recoveries will frequently run as high as 95 per cent. One southern city, however, indicates by the figures reported that the mortality varied from 13 to 50 per cent of the cases. In another one, where the mortality ran from 5 to 14 per cent for a series of years, another series of consecutive figures following this period showed a mortality from 35 to 50 per cent. In both of these cases it seems almost certain that the only explanation is that, while the numbers of deaths were reported more or less completely, a very considerable percentage of the cases which did not result in death were not reported at all. On the other hand, some of the cities show a very commendable ratio which indicates that the physicians are very particular in reporting all cases, thus making a record which proves their efficiency in treating the disease; in contrast to the evidence of the figures in the cases just mentioned, which figures, if correct, would indicate that the physicians of the city were criminally inefficient. In Atlantic City, for instance, the number of cases and deaths respectively, for a number of years, are as follows: 42, 0; 59, 5; 50, 7; 94, 5; 47, 2; 53, 4; 26, 3. These figures show a death rate which averages considerably below 10 per cent, and in only one year runs as high as 14 per cent. It would seem as though health boards, by explaining to their local physicians how failure to report all cases makes the figures show up greatly to their disadvantage as physicians, could secure a more faithful compliance with the regulations concerning the reporting of such cases.

One of the features of the report that was impressive by its frequency of repetition was the claims by the health officers that a large percentage of the typhoid cases in the city were not due to the water supply. Hartford, Conn., reported: "The increase in typhoid cases in 1914 and 1915 was due to milk epidemics. The decrease in the typhoid cases following the chlorination of our water supply of 1914 is probably not connected with the improvement of the water system, but is due to extensions of the sewerage system of the city, which were completed at that time, and to improvements in sanitary conditions of summer resorts visited by a large proportion of our population. It had not been considered that our water supply had been a source of typhoid, although conditions were such that it was opened to infection, and for that reason the chlorination of the entire supply was instituted." Terre Haute reports: "86 per cent of all fatal typhoid cases, from 1908 to 1918, were either hospital or imported cases, or were on premises supplied exclusively with water from private wells, of which there is a great number. Our supply comes from the Wabash river, which at flood stages carries a large amount of matter in suspension. We favor the use of chlorine more in our case as a precautionary measure." Cedar Rapids, Ia., says: "Nearly all of the cases of typhoid have been traceable to the use of water from private wells." In New Orleans, "The water is filtered and really has no need of the treatment, except that a certain portion of it is stored in a masonry lined and covered clear-water resevoir, the roof of which is covered with earth, so that a very small amount of seepage through this earth cover gives a few gas formers indicative of coli under the U. S. Public Health regulations for common carriers." Concerning Baltimore, assistant commissioner of health Howard says: "Filtration and chlorination should not be credited by any means with all the improvements in the typhoid rate. During this period, 1910 to 1918, the sewerage system has come into use, and over 40,000 privies put out of use, the milk much improved, flies reduced, and much better control of cases exercised by the health department. During the same time, typhoid in rural Maryland has decreased. Many cases of typhoid in Baltimore have been traced to the counties, and the Baltimore typhoid death rate is largely influenced by deaths of cases sent in from the counties for treatment." Similarly, Ann Arbor reports: "We have two large state hospitals to which patients come from this and adjoining states, so that quite a percentage of the cases are imported." Of Battle Creek it is stated: "For the last five years, careful investigation of every case of typhoid fever has proved that scarcely one originated in Battle Creek. Nearly every case was a non-resident who came here during his incubation period, or in some cases suffering from the disease when he came to the city." Also it is said that less than one-third of the cases in Duluth originate in that city, but the rest are shipped in from the surrounding territory.

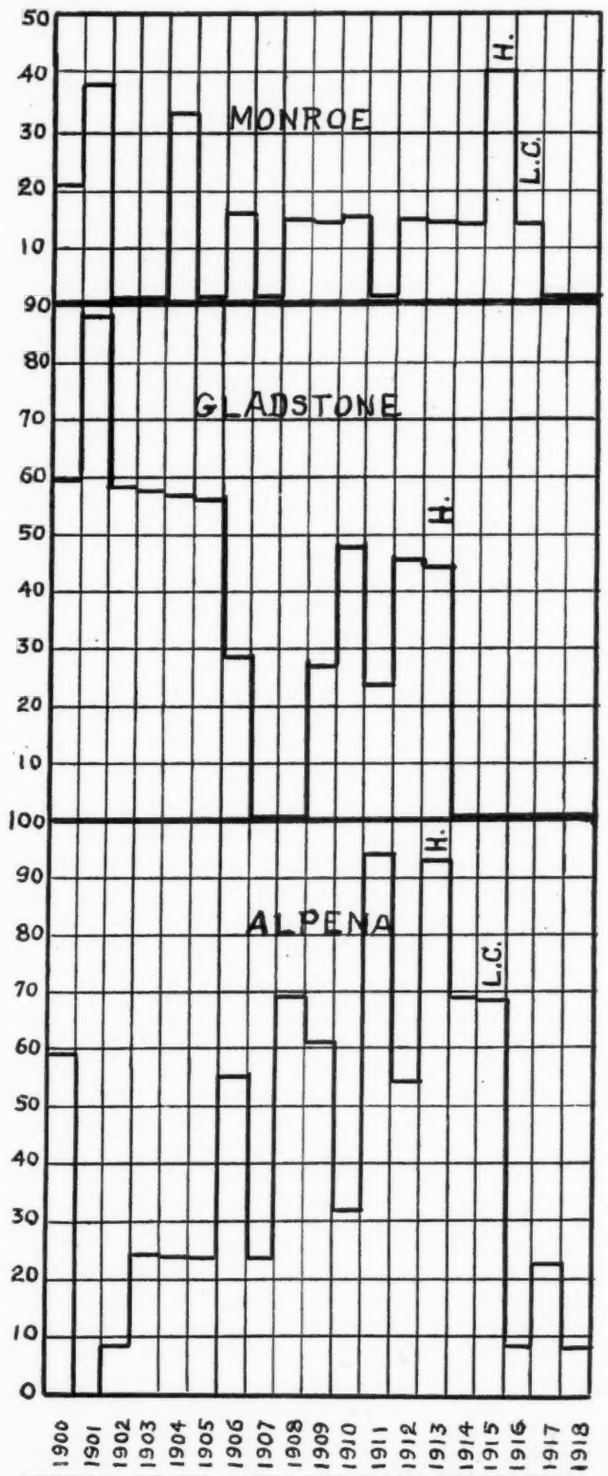
Such statements as these go far toward explaining the failure of chlorine to reduce the typhoid death rate to approximately zero in the cities where it is used, or even to effect any reduction at all in such figures in many cases. Chlorine, of course, affects the water supply only, and cases which are not due to the water cannot be prevented by the use of chlorine or any other disinfectant. The lesson from conditions reported would seem to be that the use of disinfectants should be more widespread, and should be carried into cities, towns and country districts where most of the typhoid cases originate.

A number of the cities began using hypochlorite as a disinfectant, but most of these have changed over to liquid chlorine. Among these are Terre Haute, Ind.; Ann Arbor, Battle Creek, Grand Rapids, Marine City, Marquette, Menominee, Monroe, Munising, Negaunee, Port Huron, St. Clair, St. Joseph and Traverse City, Mich.; Independence, Mo.; Ithaca, Poughkeepsie and Yonkers, N. Y.; Goldsboro, N. C.; Sandusky, O.; Rutland, Vt.; Newport News, Va. Several explain their reasons for changing. W. W. Brigden, superintendent of the Battle Creek waterworks, says: "We used hypochlorite of lime several years, but it was a dirty job to take care of it, and also the sludge was objectionable. It was very corroding on pipes. Our engineer claimed he was made sick by it several times. We then put in a liquid chlorine plant. It has worked fairly well, and while we purchased the plant before liquid chlorine plants were perfected, we are well satisfied." Still further improvements are anticipated by G. E. Willcomb, chief chemist of the Bureau of Water of Albany, N. Y., who writes: "The use of liquid chlorine is the most popular at the present time, but the difficulties of keeping the applying mechanism of this process free from leaks, and the attending dangers to the operators may cause this process to be discarded in the near future, in favor of the procedure of obtaining the chlorine on each particular job by the electrolytic dissociation of a salt solution." On the other hand, however, a number of superintendents said that the liquid chlorine plants are operated without any difficulty or objectionable features and with very little attention.

Seattle, Wash., which derives its water from the mountains, states that chlorine is used by the city simply as a safeguard, and is kept operating throughout the year so that the men in charge of the apparatus may not become rusty in their knowledge of its operation, but only sufficient chlorine is used to effect this purpose and to insure that the apparatus will be in working condition should disinfection really become necessary. On the other hand, Greenville, S. C., reports that for the last four years, the few cases of typhoid that developed in the city have been traced to outside sources; and as the number of cases was so small and the character of the water so good, they have abandoned the use of chlorine. A rather peculiar case is that of Sandusky, O., which had an epidemic in 1911, and attributed it to the fact that the filtration plant was out of operation for several weeks for repairs, and the use of chlorine was discontinued at the same time. It would seem as though, if there is ever a time when the use of chlorine would be necessary, it would be during the discontinuance of filtration.

In Cincinnati, O., disinfection was practiced intermittently, from three to seven months a year, during the years 1911 to 1917, except that it was used continuously in 1915; but since the beginning of last year it has been used continuously, and this practice is expected to be continued.

Yonkers, N. Y., has two sources of supply, one of which is filtered, and both of which have been chlorinated since 1917, although only one of the sources was so treated between 1910 and 1917. Ellenville, N. Y., derives its supplies from two brooks, but applies chlorine to only one of them. New Haven, Conn., has eight sources of supply, and chlorination of one of these was begun in 1914, and has gradually been extended to the other sources, and for the past year all the supplies have been so treated.



TYPHOID DEATH RATES PER 100,000 POPULATION
For three Michigan cities. Figures will be found in the table on the opposite page. Notes were given in last week's issue.

USE OF CHLORINE FOR MUNICIPAL WATER SUPPLIES.

City and State	Population 1910	Population 1918	Began use of chlorine	Use discontinued	Other treatment	Deaths from Typhoid — Years Before Use of Chlorine: 5	4	3	2	1	Years After Use of Chlorine: 1	2	3	4	5
Alabama:															
Talladega	5,000	6,500	1915	2 mos. of 1916, supply exhausted	None	..	..	..	..	7	4	10	2	..	..
Eufaula	6,000	6,419	1916	No	None	..	..	..	..	..	..	..	..	..	..
California:															
San Jose	28,946	41,000	1916	Yes	....	..	..	..	2	2	1	0	..	..	..
Connecticut:															
Hartford	98,915	129,353	1913	No	None	19	10	19	20	13	19	††13	††7	12	8
New Haven	133,600	165,000	1914§§	....	....	26	24	32	34	16	27	12	14	8	..
Illinois:															
Chicago	2,195,551	2,596,681	1912	No	None	..	..	271	300	241	249	167	132	128	43
Indiana:															
E. Chicago	25,000	43,000	1907	Yes	None	..	..	1	1	11	8	0	2	6	5
Indianapolis	289,000	300,000	1909	No	Filtration	..	..	..	..	..	70	63	45	62	57
Terre Haute	58,000	66,000	1911	No	Filtration	..	*	19	34	15	16	15	15	13	16
Iowa:															
Burlington	24,000	25,000	1912	No	Filtration	..	..	..	..	..	..	..	..	..	..
Cedar Rapids	32,811	45,000	1916	No	Filtration	8	11	8	3	6	10	5	..	..	..
Kansas:															
El Dorado	3,000	18,500	1918	No	Filtration	..	..	..	..	..	..	..	..	..	..
Louisiana:															
New Orleans	373,000	384,000	1915	No	Filtration	38	25	58	112	112	37	32	77	..	..
Maryland:															
Baltimore	559,530	599,653	1911	No	Filtration	183	230	180	136	235	136	140	130	128	107
Cumberland	21,938	27,298	1914	No	Filtration	..	34	22	14	20	4	3	3	3	..
Massachusetts:															
Lawrence	85,892	90,259	1919	No	Filtration	4	5	6	6	10	..	..	..	..	..
†Michigan:															
Adrian	10,763	11,662	1916	....	Filtration	27	0	19	18	17	17	26	..	..	..
Alpena	12,706	13,480	1913	....	....	69	61	32	94	54	69	68	7	22	7
Ann Arbor	14,817	15,072	1912	No	None	7	7	21	40	14	0	14	14	53	26
Battle Creek	26,000	30,900	1914	No	None	30	28	15	23	43	17	7	25	7	..
Bay City	45,166	55,000	1916	No	None	39	63	15	34	21	19	17	..	..	..
Cadillac	8,375	10,351	1919	....	....	43	0	10	40	..	..	..	..	..	..
Escanaba	13,194	16,525	1914	....	Filtration	215	60	44	36	63	27	45	37	31	..
Flint	38,550	60,000	1916	....	Filtration	19	24	15	26	10	44	22	..	..	..
Gladstone	.....	5,123	1913	....	....	0	27	48	23	45	0	0	0	0	0
Grand Rapids	112,571	133,355	1913	No	Filtration	31	18	28	26	34	27	28	15	13	8
Highland Park	4,128	38,000	1915	No	....	24	0	19	28	9	3	3	5	..	..
Hillsdale	5,001	5,257	1917	....	....	19	0	19	0	0	0	..	..	..	..
Ironwood	12,821	14,821	1917	....	Filtration	8	7	35	21	27	0	..	..	..	..
Ludington	9,132	11,334	1912	....	....	14	54	41	22	42	10	19	10	9	17
Manistique	.....	4,890	1918	....	....	0	0	0	21	0	..	..	..	..	..
Marine City	.....	3,778	1913	....	....	109	54	53	53	80	80	53	106	80	0
Marquette	11,503	12,681	1911	Several times	....	17	63	44	53	95	110	33	17	33	40
Menominee	10,507	8,586	1910	....	....	47	68	92	64	67	77	20	10	31	20
Monroe	6,893	7,928	1915	....	....	15	0	14	14	13	13	0	0	..	..
Munising	.....	4,180	1913	For 2 years	....	0	67	32	0	379	0	53	51	0	24
Negaunee	8,460	11,677	1914	....	....	0	71	23	11	32	0	26	0	..	..
Niles	5,156	5,843	1918	....	....	0	36	18	0	0	..	..	..	..	..
Petoskey	.....	4,250	1918	....	....	65	21	20	0	19	..	..	..	..	..
Port Huron	18,863	18,618	1912	....	....	14	52	74	48	200	27	0	21	32	5
St. Clair	.....	2,633	1913	....	....	185	426	38	76	76	0	14	0	11	0
St. Joseph	5,936	6,759	1912	....	....	55	18	36	102	0	64	32	16	15	15
Sault Ste. Marie	12,615	14,339	1918	....	....	33	39	7	7	28	..	..	..	..	..
South Haven	.....	3,317	1912	....	....	56	85	29	56	141	0	29	0	30	0
Traverse City	12,115	14,346	1913	....	....	59	33	25	33	24	0	0	15	14	7
Trenton	.....	1,256	1918	....	....	243	0	80	0	0	..	..	..	..	..
Wyandotte	8,287	12,103	1914	....	....	122	96	12	54	92	47	63	62	107	..
Minnesota:															
Duluth	78,446	100,000	1912	No	None	..	..	16	25	19	21	16	10	7	4
Mississippi:															
Vicksburg	20,814	24,000	1917	No	Filtration	..	..	..	..	..	..	..	..	..	..
Missouri:															
Independence	9,859	14,000	1910	No	Sedimentation	..	..	..	..	..	..	..	..	..	..
St. Louis	687,029	820,000	1914	No	Filtration	101	95	108	74	122	52	71	58	54	..
Nebraska:															
Omaha	124,096	160,000	1909	No	Sedimentation	..	..	..	..	..	..	..	..	..	..
New Jersey:															
Atlantic City	51,667	58,000	1916	No	None	3	4	4	3	5	6	2	..	..	..
Rahway	9,337	11,000	1907	No	Sedimentation	..	..	..	2	6	0	1	2	1	0
Trenton	96,815	113,974	1914	No	Filtration	25	34	32	20	15	6	3	6	5	..
New York:															
Albany	107,000	112,000	1909	No	Filtration	..	19	16	20	11	15	18	18	28	18
Buffalo	423,715	475,781	1914	No	None	96	86	108	50	68	46	51	48	37	..
Ellenville	3,000	3,114	1917	On one of 2 sources	None	0	0	1	0	0	1	..	..	..	..
Ithaca	14,700	17,500	1913	No	Filtration	1	4	4	2	3	5	6	§2	3	1
Johnstown	10,000	10,800	1918	No	None	0	0	0	0	0	..	..	..	..	..
Newburgh	25,580	30,000	1913	No	None	10	12	13	11	11	6	6	0	0	4
Niagara Falls	30,445	55,000	1912	No	Filtration	34	24	26	31	55	10	4	0	5	5
Poughkeepsie	27,936	35,000	1908	No	Filtration	..	..	9	9	..	6	5	4	4	3
Rome	20,497	25,000	1917	No	None	..	..	2	1	2	2	..	..	..	..
Yonkers	79,800	95,092	1913	No	Filtration	7	5	14	8	6	4	8	2	5	2
North Carolina:															
Goldsboro	7,000	11,000	1916	No	Filtration	..	..	..	..	..	..	..	..	..	..
‡Wilmington	25,748	32,473	1914	No	Filtration	..	..	101	36	50	9	12	9	28	..
Ohio:															
Cincinnati	362,000	414,600	1911	5 to 9 mos. a year	Filtration	239	157	64	46	21	28	24	23	29	13
Cleveland	560,663	810,306	1911	No	Filtration	93	84	64	67	105	35	83	53	54	36
Dayton	117,000	143,000	1917	....	None	22	18	11	18	26	9	..	..	..	..
Lima	30,500	50,000	1910	No	....	5	10	6	2	5	8	7	6	11	4
Sandusky	19,000	22,000	1912	No	Filtration	59	234	78	34	147	27	27	10	8	10
Springfield	47,076	53,042	1917	No	Filtration	..	14	10	6	16	9	..	..	..	..
Washington C. H.	7,000	8,000	1917	No	None	..	..	..	..	..	..	..	..	..	..
Oklahoma:															
Oklahoma City	64,000	110,000	1912	No	Sedimentation	..	..	..	..	40	16	24	17	7	16
Pennsylvania:															
Connellsville	12,845	16,500	1915	No	Filtration	5	2	2	1	27	0	1	0	..	..
Greenville	5,909	9,504	1913	No	Filtration	11	14	10	14	19	12	14	25	19	5
Harrisburg	64,186	78,154	1906	No	Filtration	..	43	40	20	17	28	30	18	21	10
Philadelphia	1,549,008	1,761,368	1913	No	Filtration	533	331	272	230	205	124	109	128	108	84
South Carolina:															
Greenville	16,000	25,000	1917	....	None	1	6	5	5	1	7	..	..	..	..
Texas:															
Fort Worth	110,000	130,000	1913	No	Filtration	..	..	..	45	45	20	33	19	21	29
Marshall	11,440	16,000	1917	No	None	..	..	..	..	..	..	..	..	..	..

(*Continued on page 444*)

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Hav Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles or any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current litnamed after each article, except that whance of this we will furnish any of the articles listed 'n the index for the price erature on muncipal matters. In furtherissues of the paper, the price given is forere an article is continued in two or three each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sumcient importance, a brief statement of its given, and the name of the author when contents is added. The length also is it is a contributed article.

ROADS AND STREETS.

Designing:

Design and Construction of the Dixie Highway from Rockwood to Monroe, Mich. Sending trucks overland; temporary macadam road and permanent concrete road; method of widening and superelevating curves. By Leroy C. Smith, engr.-mgr., Wayne County, Detroit. 2 ills., 1,700 words. Municipal and County Engineering, May. 25 cts.

Illinois Adopts a Uniform Basis of Design for All Types of Rigid Pavement. Concrete standardized, other types designed to equal it in load-carrying capacity; flexural strength to govern; brick and bituminous concrete on concrete base only other types considered for main road. By Clifford Older, chief highway engr., Dept. of Public Works and Bldgs., Ill. 2,800 words. Engineering News-Record, May 8. 20 cts.

Experiences of California Highway Commission with 4-inch Concrete Base. Thin bases have given admirable service and have proved their economy under California conditions whenever subgrade has been firm and hard and the concrete has remained in contact with subgrade. 600 words. Engineering and Contracting, May 7. 15 cts.

Super-elevations and Easements. Description of field methods of constructing pavements with banked and easement curves. By G. A. Curtis, dist. engr., Mass. Highway Comn., Pittsfield, Mass. 5 ills., 1,500 words. Good Roads, May 10. 10 cts.

Contour Method of Relocating Roads. Interesting discussion of methods used in relocations given by Gordon F. Daggett, engineer of surveys, Wisconsin Highway Commission, from which these notes are taken, 1,600 words. Engineering and Contracting, May 7. 15 cts.

Drainage:

Some Specific Suggestions on the Drainage of Roads. Quality of soil has important influence on proper method of drainage and type of foundation to be employed, and much study must be devoted to nature, type and character of soils through which road is to be built. 1,700 words. Municipal and County Engineering. May. 25 cts.

Drainage System for Improved Country Highways. Tile underdrainage would protect the surface, decrease the cost of roadside maintenance, and remove dangerous ditches. By W. P. Blair, vice-pres., National Paving Brick Manufacturers' Ass'n., Cleveland, O. 1 ill., 1,000 words. Engineering News-Record, May 8. 20 cts.

The Importance of Adequate Drainage and Foundation for Road and Street Surfaces. Rigidity in a road surface cannot be obtained without suitable underdrainage; roads on fills should be drained as well as in cuts; drainage too often neglected. Form Municipal and County Engineering, by C. Richardson, the Barber Asphalt Paving Co., N. Y. 4,500 words. Canadian Engineer, May 15. 15 cts.

Finances:

The Cost of a Mile of Road. With charts showing annual cost, including interest on construction cost, cost of maintenance and traffic, and total cost of traffic per ton mile, including transportation costs for various types of surfaces. 3 charts, 1,000 words. Engineering and Contracting, May 7. 15 cts.

The Present Level of Prices. There is unfortunately a marked degree of suspicion in the minds of the public; cost of delay in proceeding with road-building programs is more serious than the increased cost of construction. S. M. Williams, pres., Highways Industries Ass'n., Washington, D. C., 2,500 words. Canadian Engineer, May 8. 15 cts.

Unit Bidding Prices and Labor and Material Prices for State Road Work. Extracts from replies to a letter sent in April to various state highway departments. 1,000 words. Engineering and Contracting, May 7. 15 cts.

Prices of Paving and Paving Materials. Some figures comparing conditions during the past six years in fifteen cities of the Middle Atlantic states and some others, and forecasts for 1919. 1,500 words. Municipal Journal and Public Works, May 3. 10 cts.

State Roads Without Bonds. Vermont has always paid for road work as it was finished and pays special attention to maintenance. 200 words. Municipal Journal and Public Works. May 3. 10 cts.

Bonding Companies and Road Contractors. Some pertinent information regarding relation of surety company and contractor given by Edward W. Bush, engr., Aetna Casualty & Surety Co. in discussion at American Road Builders' Ass'n. 600 words. Engineering and Contracting, May 7. 15 cts.

Guarantees:

Pavement Guarantees. Only about one-third of municipal and county engineers favor guarantees. 150 words. Municipal Journal and Public Works, May 17. 10 cts.

Economic Status of guarantees for Pavements on Roads and Streets. Committee report at convention of American Road Builders' Ass'n. 2,800 words. Good Roads, May 10. 10 cts.

Pavement Guarantees. Practices of Counties throughout the country as to requiring them, and opinions of county officials as to desirability of them. 1,300 words. Municipal Journal and Public Works, May 17. 10 cts.

Construction:

Government Machinery for State Highways. Under federal road act amendments, the Secretary of War was authorized to transfer to the Secretary of Agriculture, war material, equipment and supplies not needed by War Department but suitable for use in highway improvements. 300 words. Municipal Journal and Public Works, May 10. 10 cts.

Methods of Grading for Roads Across Sloughs. Some deductions as to costs and methods that may be of interest to contractors and engineers; most common procedure is by bull-dosing or pushing the grade. By L. U. Martin. 1 ill., 1,000 words. Engineering and Contracting, May 7. 15 cts.

Convict Labor on Highway Work; Organization, Administration, Camps and Cost Data. Committee report at the meeting of the American Road Builders' Ass'n. 2 ills., 1,800 words. Good Roads, May 3. 10 cts.

Road Machinery. American highway officials must face high wages for unskilled labor for several years, hence the need for labor-saving machinery; selection of equipment should be based upon consideration of certain factors, such as character of work, specification requirements, portability of plant, transportation facilities, etc. Paper before Canadian Good Roads Congress, by A. H. Blanchard, consulting engr., N. Y. C. 3,000 words. Canadian Engineer, May 29. 15 cts.

Maintenance:

Highway Maintenance. Should begin the day the road has been completed; strict meaning of "permanent;" preventing surface wear; rules for carpet coat. Paper before Canadian Good Roads Congress, by J. A. Duchastel, city manager, Outermont, P. Q. 2,000 words. Canadian Engineer, May 29. 15 cts.

New Pennsylvania Highway Commissioner Will Not Tolerate the Ripping Open of New Pavements. Lewis S. Sadler has declared that there will be absolutely no deviation from the rule that no permanent pavement be put down until every pipe or sewer connection is made on thoroughfare to be improved. 600 words. Municipal and County Engineering, May. 25 cts.

Macadam Stone Treated with Deliquescent Salts. Roads at Detroit naval training station surfaced with this material have noiseless and dustless surface. By H. H. Edwards, highway engr., Chicago. 1,200 words. Engineering News-Record, May 15. 20 cts.

Parking Automobiles Ruins Asphalts. At recommendation of superintendent of asphalt, W. H. Eagle, of Columbus, O., an ordinance has been adopted changing the parking space from center to south side of street. 300 words. Municipal Journal and Public Works. May 17. 10 cts.

Pennsylvania Traction Engine Regulations. Aimed to protect highways from destruction by traction engines; amendments agreed on at conference of representative of State Highway officials and traction engine manufacturers. 300 words. Municipal Journal and Public Works, May 24. 10 cts.

Keeping the Highways Open in Winter. No more to be doubted today than was wireless telegraphy; solid road surface to work upon will be necessary; possible utilization of tanks. By Hon. F. Carrel, vice-pres., Canadian Automobile Ass'n. 1,600 words. Canadian Engineer, May 29. 15 cts.

Calcium Chloride in Connecticut. Experiences with its use in that state, as described by the superintendent of repairs of the state highway commission. 800 words. Municipal Journal and Public Works, May 31. 10 cts.

Method of Maintaining Michigan State Reward Roads. Outlined by L. H. Neilsen, state maintenance engineer, in report of the State Highway Commission. 900 words. Engineering and Contracting, May 7. 15 cts.

Bituminous Roads:

Bituminous Carpets on Concrete Roads. Still a debated question whether a thin bituminous carpet should be laid at all on concrete. 200 words. Engineering and Contracting, May 7. 15 cts.

Hot Mix Asphalt Pavements. Existing pavements utilized; mineral aggregates; types of hot mix pavements. Abstracts from paper before Sixth Canadian Good Roads Congress, by F. P. Smith, consulting engr., N. Y. 4,000 words. Canadian Engineer, May 22. 15 cts.

Bituminous Macadam. Nowhere extensively used until little more than ten years ago when change in vehicular traffic made necessary construction of surface to withstand new destructive forces; preparation of foundations; laying first and second course; precautions. By A. W. Dean, chief engr., Mass. Highway Commission. 1,800 words. Canadian Engineer, May 22. 15 cts. 1,800 words, Good Roads, May 31, 10 cts.

Oil Construction for the Streets. Surface treatment of old water-bound macadam; new oil-bound macadam; conditions under which each is used; financial and other advantages of the use of oil. By Chas. W. Geiger. 4 ills., 1,600 words. Municipal Journal and Public Works, May 31. 10 cts.

Defects in Surface of Bituminous Pavement Due to Concrete Base. Data collected at Oak Park, Ill., indicate that cracks and other objectionable features are a minimum where flexible foundations are used. By H. W. Skidmore, construction engr., Dept. of Public Works, Oak Park. 1 ill., 2,000 words. Engineering News-Record, May 1. 20 cts.

Hot Mix Asphalt Pavements. A technical description of the chief types of asphalt pavement mixed and laid hot. Paper before Good Roads Congress, by

F. P. Smith, Dow & Smith, N. Y. C. 2,600 words. Good Roads, May 24. 10 cts.

Limestone Rock Asphalt Produces Good Mortar. Tests show that it has high strength, light weight and marked impermeability; concrete results unsatisfactory. By J. R. Nash, office engr., State Hwy. Dept., Austin, Tex. 600 words. Engineering News-Record, May 8. 20 cts.

Concrete Pavements:

Concrete Highway Construction Standards Raised. Mississippi Valley state road officials recommend tamped concrete and heavier sections; action affects wide territory. 1,400 words. Engineering News-Record, May 15. 20 cts.

New Requirements in Illinois Specifications for Concrete Roads. Chief of these are requirements for subgrading, for consistency of concrete and for placing concrete pavement. 700 words. Engineering and Contracting, May 7. 15 cts.

Machine Finishing Concrete Roads. Description of machine developed by author and found, after numerous experiments, to be exceptionally advantageous in utilizing suction for the purpose of agitating the concrete mass. By E. G. Carr, consulting highway engr., Lakewood Engrg. Co., Cleveland. 4 ills., 1,200 words. Engineering and Contracting, May 7. 15 cts.

Charging Concrete Mixers on Road Work. Disadvantages of the system of piling materials along the road; hauling proportioned batches directly from railway siding to mixer in narrow-gage cars, motor trucks or platform trucks; tremendous possibilities of this system. By Wm. Ord. Proceedings of the Engineering Society of Wisconsin. 2,000 words. Engineering World, May 1. 15 cts.

Cost of Highway Concrete Delivered Wet by Trucks. Central crushing and mixing plant set up at quarry; concrete aggregate from crusher bin run directly into mixer and thence into trucks. 3 ills., 1,600 words. Engineering News-Record, May 1. 20 cts.

Brick Pavements:

Brick Pavements. Conditions of some pavements in middle west and conclusions drawn by engineers of the Bureau of Public Roads. 2,200 words. Municipal Journal and Public Works, May 10. 10 cts. 1,700 words. Engineering & Contracting, May 7. 15 cts.

General Features of Brick Pavement Construction. Abstracts from an interesting discussion given by A. T. Goldbeck, engineer of tests, and F. H. Jackson, assistant testing engineer of the U. S. Bureau of Public Roads, in report printed in Public Roads, the official publication of the Bureau. 4,500 words. Engineering and Contracting, May 7. 15 cts.

Poor Brick Cause Pavement Failure—The Saving of $50 for Tests Leads to Failure of a $50,000 Job. Views showing comparative results of rattler test of good and bad paving brick at Champaign, Ill. By C. C. Wiley, Associate in Civil Engrg., University of Illinois, Urbana. 4 ills., 800 words. Municipal and County Engineering, May. 25 cts.

Design and Construction of the Monolithic Brick Road South of Seneca, Ill. The hill portion of road; use of steel shod wood drag for grading. By A. H. Hunter, dist. engr., Div. of Highways, Dept. of Public Works and Bldgs., Peoria, Ill. 6 ills., 2,000 words. Municipal and County Engineering, May. 25 cts.

Other Pavements:

Procedure in Constructing an Open Joint Wood Block Pavement at Toledo, O. Paving car tracks; concave track paving; nose block used. By Raymond Pierce, construction engr., Russel & Jennison Co., Toledo. 2 ills., 1,200 words. Municipal and County Engineering, May. 25 cts.

Road Material in New Hampshire. Report on a survey of the materials available, with a discussion of their value. By J. W. Goldthwait, prof. economic geology, Dartmouth College. 3,000 words. Good Roads, May 31. 10 cts.

Gravel Roads. Commendable under conditions existing previous to 1913, but unsuitable to use for the construction of main roads under present conditions; specification for county of Middlesex, Ont., 1854. Paper before Canadian Good Roads Congress, by Chas. Talbot, county road supt., London, Ont. 1 ill., 4,300 words. Canadian Engineer, May 29. 15 cts.

Miscellaneous:

Highway Bridges and Heavy Motor Traffic. The committee on "Methods of Strengthening and Reconstructing Highway Bridges for Heavy Motor Truck Traffic" in report at American Road Builders' Ass'n., estimated 80 per cent. of the 400,000 public highway bridges in the country are unable to carry modern heavy trucks with safety. 2,200 words. Engineering and Contracting, May 7. 15 cts.

Pennsylvania Highway Bridges. State highway department will open bids for 43 bridges to be located in 11 counties which will be amply strong to carry the heaviest motor trucks. 200 words. Municipal Journal and Public Works, May 31. 10 cts.

Sidewalk Construction for New Boulevard Link, Chicago. Of particular interest because it is being done very efficiently under severe restrictions; concrete 1-2-4 mixture with 1-1 mixture of cement and granite screenings. 1 ill., 1,000 words. Engineering and Contracting, May 7. 15 cts.

Design of Concrete Sidewalks and Concrete Curb and Gutter at Street Intersections. Description of the development of a large tract of ground into improved city property in Terre Haute, Ind., by the engineer in charge of the work, W. R. Paige, civ. and consulting engr., Terre Haute. 3 ills., 1,000 words. Municipal and County Engineering, May. 25 cts.

Center Gutter Construction Used on Bituminous Street. Sidewalks with unequal exposure utilized as curbs on narrow streets; plan helped to save trees and was economical. By W. D. Johnston, city engr., Waterloo, Ia. 2 ills., 500 words. Engineering News-Record, May 15. 20 cts.

Houston Against Federal Commission Plan. Secretary of Agriculture believes establishment of a federal highway commission impracticable and unnecessary; claims existing machinery satisfactory for administering federal aid. 2,500 words. Good Roads, May 24. 10 cts.

Federal Aid Road Act Regulations. Latest regulations prepared by the Office of Public Roads for carrying out this act as recently amended. 2,300 words. Municipal Journal and Public Works, May 31. 10 cts.

The Relation of Highways to Motor Transport Efficiency. For a national system of highways; types and width of roads; uniform highway traffic laws. From paper at Conference on Modern Methods of Motor Transportation, by A. H. Blanchard, consulting highway engr., N. Y. C. 2,000 words. Municipal and County Engineering, May. 25 cts.

Texas Highways Under Construction. 80 projects totaling 1,126 miles to cost $4,862,474. 100 words. Municipal Journal and Public Works, May 17. 10 cts.

Provisions for Safety at Grade Crossings. Solved in 8 states by placing responsibility for the cautionary signals on the state, county or municipal authorities. 600 words. Engineering and Contracting, May 7. 15 cts.

Good Roads Will Bind Canada. Improved highways will enable people to know one another better and will aid in the development of our natural resources. By Hon. J. A. Tessier, Minister of Roads, Province of Quebec. 1,200 words. Canadian Engineer, May 29. 15 cts.

Highways and Railways for Defense of Our Nation. National defense plan requiring extensive construction along our borders and coasts is outlined in an illustrated booklet issued by Sauerman Bros., Monadnock Block, Chicago. 500 words. Municipal and County Engineering, May. 25 cts.

A High-Cost Highway. New Jersey, in constructing its section of the Lincoln highway, is spending unusual amount, averaging $66,000 a mile. 200 words. Municipal Journal and Public Works, May 17. 10 cts.

Colleges Should Play a Part in Highway Program. Weakness of road-engineering courses compared with great need for trained road engineers and material inspectors. By R. L. Morrison, prof. of highway engrg., Agricultural and Mechanical College of Texas, College Station, Tex. 1,000 words. Engineering News-Record, May 29. 20 cts.

Backwardness in Road Improvement. Our hard-surfaced roads total only one-tenth as great a length as those of France. 200 words. Municipal Journal and Public Works, May 24. 10 cts.

Experiences in France and England with water-bound and bituminous macadam. Information given by D. T. Black, city engineer of Welland, Ont., at conference of Roads Superintendents and Engineers in Ontario. 400 words. Engineering and Contracting, May 7. 15 cts.

County Highway Data. Supplementary to tables published in the issue of April 19 from information furnished since then; work contemplated, wages, results of heavy traffic, bridge failures and pavement guarantees. 2 pages tables. Municipal Journal and Public Works, May 24. 10 cts.

Proceedings of Canadian Good Roads Congress. Sixth annual meeting, held in Quebec City, attended by official representatives from eight of the nine provinces in Canada; Sir Lomer Gouin's discussion of federal aid creates mild sensation. 5 ills., 9,000 words. Canadian Engineer, May 29. 15 cts.

Effects of Tractive Resistance in Terms of Gasoline Consumption. Amount of gasoline consumed directly related to amount of mechanical work done in traveling over roadway—that is, amount of resistance overcome in a certain space. 3 ills., 700 words. Engineering and Contracting, May 7. 15 cts.

Daily Code Letter Shows Status of All Highway Work. Texas state highway department condenses all daily progress reports into one page by means of alphabetical symbols. By J. Montgomery, div. engr., Texas State Highway Dept. 1 ill., 700 words. Engineering News-Record, May 29. 20 cts.

Utilizing Old Macadam as a Base for Pavements. Can be very cheaply resurfaced if it is loosened by a scarifier and spread by a heavy harrow. 300 words. Engineering and Contracting, May 7. 15 cts.

SEWERAGE AND SANITATION.

Sewage Treatment:

The Sewage Disposal Problem in Chicago. Unsettled controversy with Federal Government; Present situation critical, people unconcerned; treatment works must be built. By C. D. Hill, engr., Board of Local Improvements, Chicago. 1,600 words. Municipal and County Engineering, May. 25 cts.

Sewage Disposal of the Loop District, Chicago. Fundamentals of a new system, prepared by the author and submitted to the City Council; problem of satisfactory disposition of Chicago's sewage becoming more pressing each day; inverted siphons and pumps in sewage system. By C. D. Hill, engr. of construction, Board of Local Improvements, Chicago. 2 ills., 3,500 words. Engineering World, May 15. 15 cts.

Sewage Disposal at Columbus. Some features of report for 1918; purification not sufficient under summer conditions; tank foaming; filter flies. 1,000 words. Municipal Journal and Public Works, May 10. 10 cts.

Something New in Sewage Treatment. Editorial reference to three articles in this and last week's issue on methods of treating sewage, indicating the diversity of methods now available. 400 words. Municipal Journal and Public Works, May 31. 10 cts.

Disposal of Sewage by Treatment with Acid. Miles process is worthy of consideration for cities where large volume of strong sewage is discharged; causes no local nuisance. Paper read before the Boston Society of Civil Engineers, by E. S. Dorr, engr. of sewer service, Boston, and R. S. Weston, of Weston & Sampson, Boston. 7,500 words. Canadian Engineer, May 15. 15 cts.

Results of Experiments with Miles Acid Process of Sewage Treatment. Abstract of an interesting resume given by Edgar S. Dorr and Rob. S. Weston, both of Boston, in the April journal of the Boston Society of Civil Engineers. 5,000 words. Engineering and Contracting, May 14. 15 cts.

Acid Treatment of Sewage. Deoxygenating effect, comparison with Imhoff and activated sludge, and other features discussed by E. S. Dorr, R. S. Weston and H. W. Clark. 1,200 words. Municipal Journal and Public Works, May 24. 10 cts.

Operation of Fine Sewage Screen at Long Beach, Cal. Tests indicate that screens remove 16.3% of solids; screenings incinerated by gas; operating costs. 1,300 words. Engineering News-Record, May 22. 20 cts.

Sewage Treatment at Bridgeport. History of the studies of the problem; Imhoff tanks first proposed; fine screens finally adopted and under construction. By J. A. McElroy, city engr. 900 words. Municipal Journal and Public Works, May 24. 10 cts.

Insect Aid to Filtration. On several English percolating filters ponding is entirely prevented by the achorutes; re-

sults of investigations and experiments. 1,000 words. Municipal Journal and Public Works, May 31. 10 cts.

Septic Tank Patent Settlement. The National Septic Process Protective League accepted last month the offer of the Cameron Septic Tank Co., owner of the American patent, by the terms of which the League pays $5,000 to the company, for the release of each member of the league from claims of infringement, damage, etc. 300 words. Municipal Journal and Public Works, May 31. 10 cts.

Activated Sludge Without Compressed Air. Experiments at Sheffield, England, indicate possibilities of substituting mechanical stirring for use of compressed aid; aerated by surface absorption. 800 words. Municipal Journal and Public Works. May 17. 10 cts.

Mechanical Agitation for Activated Sludge. Editorial referring to experiments made in England demonstrating that applied air was not necessary. 200 words. Municipal Journal and Public Works, May 17. 10 cts.

Analyses:

Dissolved Oxygen as an Index of the Pollution of New York Harbor. Purpose of this article to show to what extent pollution of the main parts of harbor has progressed, as made manifest by determinations of dissolved oxygen. By Kenneth Allen, sanitary engr., Board of Estimate and Apportionment, N. Y. C. 1,000 words. Municipal and County Engineering, May. 25 cts.

Bacterial Count in Water and Sewage. Critical study of a generally used measure for sanitary phases of water supply and sewage disposal; mathematical interpretation of results; applying standard methods to special conditions. By M. F. Stein, designing engr., division of sanitary engrg., Cleveland, O. 2 ills., 3,200 words. Fire and Water Engineering, May 28. 15 cts.

Sanitation:

A Problem in Anopheles Elimination. Preventing breeding in shallow edges of pond by use of cofferdams and drains, and by filling in. 1 ill., 1,300 words. Municipal Journal and Public Works, May 17. 10 cts.

Mosquito Extermination as an Investment. Editorial referring to New Jerseys' successful effort to prevent and clean up breeding spots, and to article in this issue describing how one small local problem of this kind was solved. 500 words. Municipal Journal and Public Works, May 17. 10 cts.

Land Drainage Procedure in Iowa. Estimated that the state will have used enough drain tile within next 10 years to traverse the circumference of the earth five times; sizes range from 4 inches to 6 feet in diameter. By G. D. Hart, C.E., Bancroft, Ia. 4 ills., 1,500 words. Municipal and County Engineering, May. 25 cts.

WATER SUPPLY.

Purification:

Methods of Removing Crenothrix from Public Water Supplies—Chlorine Treatment is Successful. Life processes of crenothrix; iron removal by crenothrix growing in filters; chloramine experiments and treatment. Paper before the Indiana Sanitary and Water Supply Ass'n, by W. F. Montfort, consulting chemist, St. Louis, Mo. 3,200 words. Municipal and County Engineering, May. 25 cts.

Water-Softening Sludge Repumped Eliminates After-Reactions. Results of a large-scale experiment at Grand Rapids, Mich., told by W. A. Sperry, chemist in charge, in paper before the Illinois section of the American Waterworks Ass'n; experiment suggested by what is being done with the use of air and sludge in the treatment of sewage. 600 words. Engineering News-Record, May 15. 20 cts.

Old, Overworked Filter Plants a Serious Health Menace. Quoting letter from a correspondent describing obsolescent condition of a waterworks and water-purification plant in a Middle West town. 800 words. Engineering News-Record, May 22. 20 cts.

Testing Stations for Determining Critical Factors for Water Purification Plant Design. Descriptions of the testing stations at Whiting and Midland, Ind.; costs of water testing stations. Abstract of paper before the Illinois section of the American Waterworks Ass'n, by W. T. M'Clenahan and R. S. Rankin, ass't engrs., Pearse & Greeley, Chicago. 3,000 words. Engineering and Contracting, May 14. 15 cts.

Report on Detroit Waterworks. Filter plant operated for 12 months; demonstrates possibility of filtering Detroit's water at very high rate; as demonstration plant it educates public; plans for permanent plant. 3 ills., 3,800 words. Municipal Journal and Public Works, May 10. 10 cts.

Differentia of B. Coli. The two groups of the B. Coli group, of most importance to the water bacteriologist, briefly considered; varied conclusions of investigators; determining nature and source of pollution. By Everett Judson, ass't sanitary engr., U. S. Public Health Service, paper before Illinois section of American Waterworks Ass'n. 1,000 words. Fire and Water Engineering, May 7. 15 cts.

The Bacteriological Standards for Drinking Water Supplies in Interstate Commerce. Giving standard adopted by the Treasury Department, which was recommended by a commission of leading sanitarians and bacteriologists of wide experience. By E. Judson, ass't sanitary engr., U. S. Public Health Service, from paper before the Indiana Water Supply Ass'n. 1,500 words. Engineering and Contracting, May 14. 15 cts.

Operation of Louisville Filter Plant. Removal of bacteria and suspended matter, amount and cost of chemicals and total cost of purification; cleaning sedimentation reservoir; brass holding-down screens in filters removed. 1 ill., 1,500 words. Municipal Journal and Public Works, May 24. 10 cts.

Chlorine Treatment a Boon, Not a Menace. Editorial comment on an anonymous article in the March issue of "Conservation," the official publication of the Commission of Conservation, Ottawa, entitled "Chlorine Treatment Temporary Measure. Defects in the System Render it a Constant Danger to Public Health." 1,400 words. Canadian Engineer, May 8. 15 cts.

Pumping:

Electrically Driven Pumps. For small waterworks the unit driven by electricity is particularly adaptable; growing tendency to replace other forms of power with electricity; advantages of its use in small developments. By D. D. Ewing, prof. of electric railway engineering, Purdue University, Lafayette, Ind. 1,700 words. Fire and Water Engineering, May 28. 15 cts.

Graphical Records of Surge Pressures in Pipe Lines. Tests made to determine effect of varying air-chamber conditions and changing choke gate area. By Ralph Bennett, Los Angeles, Cal. 4 ills., 1,700 words. Engineering News-Record, May 29. 20 cts.

Emergency Pumping at Grinnell. Investigation of the cost to the Iowa city department through an appeal to the Iowa State Board of Conciliation; result was saving of $5,000 a year to city. By Wm. G. Raymond, dean, College of Applied Science, State University of Iowa. 1,800 words. Fire and Water Engineering, May 21. 15 cts.

Cost of Pumping Through Pipe Lines. With table cost of delivering water at uniform rates of flow through pipe lines. From paper before the Illinois section of the American Waterworks Ass'n, by G. C. Habermeyer, acting chief, Ill. State Water Survey. 1 table, 700 words. Engineering and Contracting, May 14. 15 cts.

Reservoirs and Dams:

Flat Slab Substituted for Groined Roof of Reservoir. Money saved in Dayton waterworks structure due to less concrete and excavation and simpler forms. By H. C. Wight, supt., Division of Water, Dayton, O. 3 ills., 1,000 words. Engineering News-Record, May 22. 20 cts.

Improving Providence Water Supply. A temporary dam and a regulating dam with spillway of horse-shoe shape; completion of new reservoir will permit the elimination of pumping. By J. R. Hess, Jr. 3 ills., 2,000 words. Municipal Journal and Public Works, May 17. 10 cts.

The High Service Reservoir of the St. Paul, Minn., Waterworks. Description of the design and construction of the work by the designing and constructing engineer in charge, W. N. Jones. 6 ills., 3,000 words. Municipal and County Engineering, May. 25 cts.

Circular Concrete Reservoirs at Leamington, Ont. Provide storage of one million imperial gallons, which will supply town for several days and complies with requirements of the fire underwriters; low unit stress in steel; walls entirely separate from floors. By E. M. Proctor, James Loudon & Hertzberg, Ltd., Toronto. 8 ills., 1,600 words. Canadian Engineer, May 8. 15 cts.

Sweetwater Dam Enlarged for the Third Time. Latest reconstruction adds to height, provides siphon spillways and enlarges weir spillways to take care of maximum flood; second time dam has been given more spillway capacity. By H. N. Savage, consulting engr., Sweetwater Co., San Diego, Cal. 6 ills., 3,800 words. Engineering News Record, May 15. 20 cts.

The Measurement of Snow. Description of snow sampler; water equivalent of accumulated snow. From "The Measurement of Rainfall and Snow" in March proceedings of New England Waterworks Ass'n. By Rob. E. Horton, consulting engr., Albany, N. Y. 5 ills., 1,500 words. Canadian Engineer, May 1. 15 cts.

Rainfall, Absorption and Run-Off on Small Rural Drainage Area. Study of heavy rain, total run-off with soil absorption and run-off for small plants; the hydraulic jump. By Ivan E. Houk, ass't engr., Miami Conservancy dist., Dayton, O. 1,500 words. Engineering News-Record, May 1. 20 cts.

Fire Protection Charges:

Metering Private Sprinkler Systems. Brief description and illustration of system of metering water service connection used for private sprinkler systems in Lancaster, Pa. 1 ill., 500 words. Municipal Journal and Public Works, May 24. 10 cts.

Proper Regulations Governing Private Fire Protection Water Service Lines. Special Fire Protection by Independent Plants; references to court decisions concerning private fire protection. Paper before the Indiana Sanitary and Water Supply Ass'n, by D. R. Gwinn, pres. & mgr. of the Terre Haute Waterworks Co., Terre Haute, Ind. 3,800 words. Municipal and County Engineering, May. 25 cts.

Diagrammatic Representation of Public Utility Commission Decisions on Fire Charges. Diagrams prepared by Chester & Fleming, consulting engineers, Pittsburgh, as a guide to show what portion of water charges should be allocated to fire service. 4 diagrams, 1 table, 400 words. Engineering and Contracting, May 14. 15 cts.

Water Supplies:

Future Public Water Supplies in Iowa. Descriptive rather than technical discussion of the subject. By Lafayette Higgins. 3,500 words. Engineering World, May 1. 15 cts. 1,600 words. Engineering and Contracting, May 14. 15 cts.

Moose Jaw, Sask., Waterworks. Proposed extension to the Saskatchewan River; 70 miles of pipe line; using 24-inch continuous wood stave pipe; 2,000,000 gallon reservoir; no filtration required. 900 words. Canadian Engineer. May 22. 15 cts.

Water Supply for Camp Las Casas. Porto Rico camp for the draft army of the U. S. island possession draws water supply from San Juan; stored in elevated wooden tanks, with bases of concrete; labor plentiful, but heavy machinery scarce. By C. B. Burdick, Alvord & Burdick, engrs. 3 ills., 1,000 words. Fire and Water Engineering, May 14. 15 cts.

Okmulgee's Water Supply and Sewerage. Increasing capacity and purity of water supply; constructing sewage treatment plant and reconstructing sewerage system. 2,200 words. Municipal Journal and Public Works, May 10. 10 cts.

Miscellaneous:

Large Capacity Well Installation and Operation. Tuning-up process with gravel insertion stablizes yield; high overall efficiency obtained with six-stage pump. 3 ills., 1,300 words. Engineering News-Record, May 1. 20 cts.

Canal System Used Alternately to Irrigate and Drain. Low-lift pumps required for part of area, but much of it is served by gravity auxiliary canals. 2 ills., 1,300 words. Engineering News-Record, May 8. 20 cts.

Sinking a Concrete Pumping Station in a River. House consisting of concrete cylinder 30 feet in diameter is lowered while being built from frame controlled by ratchet wrenches tied together for simultaneous movement. By K. O. Guthrie, engrg. contractor, Schenectady, N. Y. 6 ills., 1,800 words. Engineering News-Record, May 22. 20 cts.

Arizona Has New Water Code. Main purpose the protection of vested and initiated rights to the use of water, of the interest of public in the water supplies, and encouragement for the highest possible development of such supplies. By G. E. P. Smith, prof. of irrigation engrg., University of Arizona, Tucson, Ariz. 700 words. Engineering News-Record, May 22. 20 cts.

LIGHTING AND POWER.

Street Lighting:

Street Lighting in Austin. E. C. Bartholomew, up to this year in charge of the Department of Water, Light & Power, stated in his report for 1918 that an underground conduit system had been completed costing $60,000 and requiring almost 2 years for construction. 700 words. Municipal Journal and Public Works, May. 10 cts.

McPherson's Electric Department. Extensive use of current for cooking; recent extensions to plant; financial statement. 600 words. Municipal Journal and Public Works. May 31. 10 cts.

The Lighting Plant of St. Charles, Ill. A financial as well as a physical success; receipts have increased from $16,891 in 1914 to $20,768 in 1918. 300 words. Municipal Journal and Public Works, May 3. 10 cts.

South Norwalk's New Street Lighting. Lights and fixtures designed for this installation, supported on ornamental poles that also carry wires of private companies and of the municipal fire and police telegraph. 2 ills., 1,700 words. Municipal Journal and Public Works, May 3. 10 cts.

Report of the National Electric Light Association Convention. Telegraphic report of proceedings of the 15 sessions of the Atlantic City convention; brief account of most successful gathering in the history of central-station industry. 3 ills., 17,000 words. Electrical Review, May 24. 30 cts.

National Electric Light Association Meets at Atlantic City. Subjects discussed at the general sessions included municipal ownership, conservation of power resources and lamp production; technical sessions took up questions of prime movers, oil switches, underground construction and overhead lines. 2,300 words. Electric Railway Journal, May 31. 15 cts. 11 ills., 6,000 words. Electrical Review, May 17. 30 cts.

Hydroelectric Power:

Hydroelectric Development on Wisconsin River at Stevens Point. Description of hydroelectric development; interesting instance where load was developed with the generating station; simplicity marks installation; interconnection of systems. By Wm. F. Snyder, electrical supt., Consolidated Water Power & Paper Co. 2,500 words. Electrical Review, May 31. 30 cts.

Water-Power Utilization Urged in Great Britain. Utilization urged by state development; quick policy to provide employment. By our British correspondent. 1,000 words. Electrical Review, May 3. 30 cts.

Features of Mammoth Waterwheel Generator. Method of construction employed on one of the 32,500-Kva. generators which are being built for the Niagara Falls Power Co.; conservation in design and highest possible efficiency characterize this unit. 4 ills., 2,000 words. Electrical World, May 31. 15 cts.

The New Pompton Lake Hydroelectric Plant. Typical example of small water power developed advantageously for lighting and power service in New Jersey. 2 ills., 300 words. Electrical Review, May 3. 30 cts.

Opportunities for and Data on Small Municipal Hydroelectric Plants. The field for municipal ownership; reclaiming abandoned water powers; equipment and power per capita and costs; transmission, distribution and operating costs; hints on water power investigation. By Wm. G. Fargo, of Fargo Engrg. Co., Jackson, Mich. 3 ills., 3,000 words. Municipal and County Engineering, May. 25 cts.

Russian Water-Power Possibilities at Dnieper River Rapids. Hydraulic and canalization project interrupted by war; four dams and power plants would give about 600,000 horsepower nominal. By V. V. Tchikoff, consulting civ. engr., Berkeley, Cal. 1 ill., 1,000 words. Engineering News-Record, May 29. 20 cts.

Big Chute Generating Station. In 1909 the Simcoe Railway and Power Co. commenced development on the Severn River; transmitted power at 22,000 volts to their substation at Midland and thence to the municipality of Midland at 2,300 volts. By W. L. Amos, ass't engr., Hydroelectric Power Comn. of Ontario. 4 ills., 2,000 words. Canadian Engineer, May 8. 15 cts.

Economical Section of Water Conduit for Power Development. Formula for the best slope and size of conduit is deduced, which takes into account the construction costs, value of power recovered, and rate of returns expected on expenditures made, as well as other physical conditions of the problem. From paper before American Society of Mechanical Engineers by C. T. Hutchinson, consulting engr., N. Y. 3 ills., 2,000 words. Engineering and Contracting, May 14. 15 cts.

Gas:

Domestic and Industrial Use of Natural Gas. The attorney for the Equitable Gas Company tells the Public Service Commission of Pennsylvania about conditions in Pittsburgh district. By John Gates, Jr., Pittsburgh, Pa. 2,200 words. Gas Age, May 1. 20 cts.

Utilization and Conservation of Natural Gas. Discussion by the vice-president of the U. S. Natural Gas Co. at a conference called by the Public Service Commission of Pennsylvania. By L. I. Graham, Oil City, Pa. 2,200 words. Gas Age, May 1. 20 cts.

New Coke Ovens at the Providence Gas Works. A beautifully designed and well equipped plant embodying the latest improvements in coke and oven installations for providing city supply. By E. H. Bauer, Providence, R. I. 12 ills., 1,200 words. May 1. 5 ills., 4,000 words. May 15. Gas Age. 20 cts.

Miscellaneous:

Principles of Boiler Water Treatment. Nature and origin of scale-forming material and means of removing scale-forming elements and scale already formed; economies effected by softening water. Notes from a bulletin issued by the U. S. Fuel Administration as a means of encouraging economy in use of fuel. 2,500 words. Engineering and Contracting, May 14. 15 cts.

Planning for Power. Importance in further industrial development; need for systematic and efficient power development; power investigation undertaken by the Geological Survey; possibilities for central-station service to the nation. By Geo. Otis Smith, director, U. S. Geological Survey. 5,000 words. Electrical Review, May 31. 30 cts.

Public Policy on the Pacific Coast. Report of Pacific Coast section of the National Electric Light Ass'n directs attention to interconnection, water-power wastes, labor rate and other issues; "possibilities are boundless." By J. A. Britton, Pacific Gas & Electric Co. 2 ills., 1,800 words. Electrical World, May 24. 15 cts.

Cost Comparison of Transformer Types. Rational method of proportioning dimensions of single-phase transformers to obtain minimum cost for material; comparison between five types of single-phase transformer designed from same specifications. By B. C. Dennison, department electrical engineering, Carnegie Institute of Technology. 3 ills., 3,300 words. Electrical World, May 31. 15 cts.

REFUSE DISPOSAL.

Garbage Utilization by the Army. Editorial discussion of the feasibility of garbage utilization with reference to Mr. Bamman's article last week and this on the effects of its use in army camps. 300 words. Municipal Journal and Public Works. May 3. 10 cts.

The Army's Utilization of Camp Wastes. New form of contract secures greater economy in the use of food, more material from which glycerine can be derived, and larger revenue; tabulated data from the various camps. By F. C. Bamman. 4 tables, 2,000 words. Municipal Journal and Public Works, May 3. 10 cts.

Hog Feeding in Spokane. Plan developed whereby garbage will be collected without cost to householders and fed to hogs. 350 words. Municipal Journal and Public Works, May 17. 10 cts.

The Columbus Reduction Plant. Operation affected by abnormal conditions due to war, the worst being the reduction in raw material. From report by the superintendent of the plant, Thos. D. Banks. 400 words. Municipal Journal and Public Works, May 24. 10 cts.

FIRE AND POLICE.

No Government Fire Apparatus to Be Sold. Statement from Director of Sales of War Department sets at rest rumors that used apparatus from abandoned government institutions were to be thrown upon market; only enough for its use after redistribution. 800 words. Fire and Water Engineering, May 14. 15 cts.

Send the Chief. The advantages to him and his department will far offset the amount spent by the municipality in doing this; comparison of new methods of fire control and new apparatus will alone repay the outlay. 1,000 words. Fire and Water Engineering, May 14. 15 cts.

The New York Fire Patrol. History and description of the organization; under direction of the New York Board of Fire Underwriters; duties do not conflict with those of the fire department. By J. O. Schwank, supt., N. Y., Fire Patrol and Fire Insurance Salvage Corps. 7 ills., 1,800 words. Fire and Water Engineering, May 7. 15 cts.

Ladders. Theory of stresses in beams and trusses applicable; ladders used for fire departments of the truss in majority of cases; practical construction; difference of opinion as to proper method of use. By R. T. Reddy, Alliance, O. 10 ills., 2,000 words. Fire and Water Engineering, May 21. 15 cts.

Air Patrolmen. May soon become a necessity for the safety of aviators and those below, and as aid to the fire department. 100 words. Municipal Journal and Public Works, May 3. 10 cts.

CITY PLANNING AND HOUSING.

City Planning:

Town Planning Institute of Canada. Giving the provisional constitution and by-laws of the institute, the inaugural meeting of which is to be held at an early date. 1,700 words. Canadian Engineer, May 15. 15 cts.

The Relation of Sunlight to Town Planning. Some well-known astronomical and other facts about the sun which should be considered in determining the direction and width of streets, height, orientation and density of buildings and similar matters. From paper before the Ottawa Branch of the Royal Astronomical Society by H. L. Seymour, engrg. ass't to the Dominion Housing Comn. and Town-Planning Advisor. 2,500 words. Engineering and Contracting, May 7. 15 cts.

Proposed Lake Front Improvement at Chicago. South Park Commissioners, the city, the Illinois Central Railroad Co. and the War Department, through the Chicago Railway Terminals Commission, are collaborating on the work; provisions in detail. Engineering World, May 15. 15 cts.

Maps:

Reference Maps More Accessible. Quarter section sheets of city map of Portland, Ore., numbered with reference to base line and meridian. By O. E. Stanley, sewer engr., Portland. 1 ill., 1,000 words. Engineering News-Record, May 8. 20 cts.

City Maps. Waltham, Mass., a city of 32,000 population, is provided with a number of maps of its area drawn to different scales for the several purposes. 300 words. Municipal Journal and Public Works, May 31. 10 cts.

Housing:

Aid the "Own-Your-Own Home" Campaign. Appeal made by the U. S. Department of Labor to various municipalities for aid of a kind which can be rendered only by official action. 250 words. Municipal Journal and Public Works, May 10. 10 cts.

Home Buying in Detroit. To aid its employes in acquiring homes the American Blower Co. has organized an advisory and financial service in its welfare department; motive is to help employes relieve the almost intolerable housing conditions in Detroit and to make its employes permanent. By J. H. Collins. 1,500 words. Municipal Journal and Public Works, May 31. 10 cts.

How One Contractor Went About a Housing Job. Building 450 small dwellings for shipyard workers in limited time required organization of forces and planning of operations in different manner from that of usual large-contract job. By Jos. Meltzer, of Jos. Meltzer & Co., Boston, Mass. 5 ills., 3,000 words. Engineering News-Record, May 29. 20 cts.

Meeting Housing Problem at Tacoma. The Todd Dry Dock & Construction Co. recently completed the building of 48 houses in Todd Heights section of the city. By W. A. Scott. 800 words. Engineering World, May 1. 15 cts.

MATERIALS AND CONSTRUCTION.

Concrete:

Portland Cement Production in 1918. U. S. Geological survey gives out advance statement of final figures on amount and value of cement production. 500 words. Good Roads, May 31. 10 cts.

Standard Precast Concrete Frames Make Up Flume Trestles. Section cast along line put together to carry conduit over gullies up to 180 feet long and 36 feet deep. 3 ills., 1,000 words. Engineering News-Record, May 15. 20 cts.

Frozen Concrete Thawed by Putting Warm Concrete on Surface. It is also found that chemical changes in setting concrete produced enough heat to prevent freezing. 600 words. Engineering News-Record, May 15. 20 cts.

Fundamentals in the Make-Up of a Concrete Mixture. 13 points offered by A. N. Talbot governing the physical conditions which affect concrete making. 1,200 words. Engineering News-Record, May 1. 20 cts.

Improving Concrete by Rodding. Tests show that strength is increased materially by continuous agitation of wet concrete with rods. By F. E. Giesecke, head of Division of Engrg., Bureau of Economic Geology and Technology, University of Texas, Austin. 2 ills., 1,000 words. Engineering News-Record, May 15. 20 cts. 1,000 words. Engineering and Contracting, May 21. 15 cts.

Reinforced Concrete Culverts Under Irrigation Canal. After many experiments engineers on Rio Grande project adopt cradle construction for drains in quicksand. By D. C. Willett, El Paso, Tex. 2 ills., 400 words. Engineering News-Record, May 8. 20 cts.

Concrete in Roads, Bridges and Culverts. Fine aggregate should be tested for organic impurities, gradation (sieve analysis), mortar strength and volume of silt or loam; field tests of fine aggregate; Deval abrasion test. Paper before Canadian Good Roads Congress by H. Eltinge Breed, consulting engr., N. Y. C. 1 ill., 3,000 words. Canadian Engineer, May 29. 15 cts.

Physical Properties of Mortars and Concretes. Review of work done by other investigators and description of experiments performed for the greater Winnipeg water district; use of chemicals to resist alkali action abandoned after trial on one of the district's structures. By H. M. Thompson, laboratory engr., Greater Winnipeg Water Dist. 18 ills., 6,000 words. Canadian Engineer, May 1. 15 cts.

Bulking Effect of Moisture in Sands. Varying percentages of moisture in sand aggregate an important factor in concrete making; wet sands weigh less than dry; suggested methods of overcoming irregularities due to moisture. By Capt. L. N. Edwards, supervising engr. of bridges, Toronto, Ont., referring to the article entitled "The Design of Concrete Mixtures" in the issue of April 23. 900 words. Engineering and Contracting, May 28. 15 cts.

Labor-Saving Equipment for Handling Concrete Materials. Description of charging bin developed by the R. D. Baker Co., Detroit; materials dumped directly into the bin and from there to a measuring device into the mixer hopper. Described by Mr. Baker in Concrete Highway Magazine, from which this abstract is taken. 1 ill., 900 words. Engineering and Contracting, May 7. 15 cts.

Testing Materials:

Organization of a Standard Municipal Testing Laboratory. Essential duties are to develop uniform standards, establish fair basis for purchasing materials, obtain proper qualities in materials, insure proper usage, reduce risk costs and aid in advancement of knowledge of materials. From Cornell Civil Engineer, by Ass't Engr. J. O. Preston, Rochester Bureau of Municipal Research, Inc. 2,500 words. Canadian Engineer, May 22. 15 cts.

Why Materials of Construction Should Be Tested Prior to Their Use. Quick and slow setting cement; deterioration during storage; injurious chemicals in sand; poor sand responsible for most concrete failures. By Emanuel Mavant, concrete expert with Milton Hersey Co., Ltd., Montreal and Winnipeg, Canada. 2,700 words. Municipal and County Engineering, May. 25 cts.

Road Material Testing in Texas. Large number of tests made by laboratory of University of Texas indicates great activity in road work. 400 words. Good Roads, May 24. 10 cts.

Bridges:

Pneumatic Caissons with Wooden Cylinders for Sinking Bridge Piers. Used in construction of piers for 3 bridges now being built under the plans of Harrington, Howard & Ash, of Kansas City, Mo. 3 ills., 1,100 words. Engineering and Contracting, May 28. 15 cts.

Cost of Concrete Bridges. Figures sent through courtesy of W. E. Emery, superintendent of highways of Peoria County, Ill. 200 words. Municipal Journal and Public Works, May 17. 10 cts.

An Unusual Concrete Highway Bridge. Built near Greenup, Ky., having total length of 200 feet; consists of 8 spans, supported by open bents varying in height from 29 to 35 feet; each span has 4 girders connected by 8-inch floor slab combined in T-beam construction. By C. S. Bennett. 1 ill., 800 words. Municipal Journal and Public Works, May 24. 10 cts.

Cost-Plus-Fee Contract for Bridge Construction. Excellent competition under cost-plus-fee form obtained recently at a bridge letting in Kansas City, Mo. From "Engineering and Contracting." 2,300 words. Canadian Engineer, May 8. 15 cts.

Reinforcement of Bridge by Means of an Eccentric Chord. Floor span over railway weakened by corrosion; war conditions delay renewal; erection conditions necessitate placing new chord above floor; panels offset to balance eccentricity. 4 ills., 1,600 words. Engineering News-Record, May 8. 20 cts.

Put New Chords on Drawbridge Carrying Traffic. Engineer plans work to avoid closing of busy street; bridge swings free of end supports while riveting is done. 1 ill., 500 words. Engineering News-Record, May 15. 20 cts.

Recommended Procedure in the Painting and Maintenance of Highway Bridges. Classification of structures according to conditions; strengthening and repairing old bridges. By Chas. D. Snead, bridge engr., Kentucky Dept. of Public Roads, Frankfort, Ky. 1,400 words. Municipal and County Engineering, May. 25 cts.

Raising Allegheny River Bridge 13 Feet by Jacking. Without interruption of traffic under-clearance of four-track two-level steel structure at Pittsburgh is increased 12.6 feet. 10 ills., 3,200 words. Engineering News-Record, May 1. 20 cts.

Design of New Superstructure of Louisville Bridge with 644-Foot Riveted Span. Historic bridge one mile long replaced by double-track spans on same masonry piers; details of design and of deck trusses and lift span. 6 ills., 4,000 words. Engineering News-Record, May 22. 20 cts.

Maintaining Traffic During Erection of Louisville Bridge. Floods and washouts caused by swift current of Ohio River force revision of methods; timber towers support longitudinal steel girders. 7 ills., 2,100 words. Engineering News-Record, May 29. 20 cts.

TRAFFIC AND TRANSPORTATION.

Street Railways:

Plain Words on Transportation Service. Concrete suggestions are made on ways in which the service can be improved in schedule making, lay-overs, traffic supervision, assignment of runs and other ways. By A. Jackson, supt. of timetables, Public Service Railway, Newark, N. J. 2,600 words. Electric Railway Journal, May 31. 15 cts.

Municipal Railway System of San Francisco. Letter from M. M. O'Shaughnessy, city engineer of San Francisco, protesting against an editorial which appeared in the Feb. 19 issue of Engineering and Contracting entitled "San Francisco's Municipal Railway Is No Gold Mine." 500 words. Engineering and Contracting, May 21. 15 cts.

The Zone Fare in Practice. Dublin's housing problem arose from activities of house jobbers in old wealthy sections and from immigration of laborers to city from country because of high wages; tramway company has built 220 houses for employes. By Walter Jackson. 10 ills., 5,000 words. Electric Railway Journal, May 31. 15 cts.

Street Car Loop Subway Proposed by Pittsburgh. $6,000,000 municipal project to relieve downtown traffic congestion advocated by city authorities. 1 ill., 700 words. Engineering News-Record, May 29. 20 cts.

Motor Trucks:

The Field for Industrial Electric Trucks and Tractors. Tremendous possibilities of this equipment but little known; some features of the apparatus; need for central-station co-operation. 7 ills., 4,700 words. Electrical Review, May 17. 30 cts.

Tractors Reduce Service Cost at Machinery Plant. Dispatcher system with truck trains on paved roadways handles more material with fewer men than old teams. 3 ills., 800 words. Engineering News-Record, May 8. 20 cts.

How the Problem of Motor Transportation Will Be Solved. By good roads engineers and motor truck engineers working in co-operation to achieve the desired end. By R. E. Fulton, vice-pres., International Motor Co. 1 ill., 1,800 words. Good Roads, May 17. 10 cts.

Comparison of Short-Haul Truck and Rail Shipments. Trucks reported to be efficient for 125-mile hauls; freight delays, extra boxing, clerical work prove expensive items. 1,200 words. Engineering News-Record, May 8. 20 cts.

Motor Truck Haulage Saves About $1,000 per Mile in Gravel Road Construction. Saving of $6,000 effected in this way by Itasca County, Minn., on Grand Rapids-Duluth Highway. 1 ill., 600 words. Engineering and Contracting, May 7. 15 cts.

(To be continued next week.)

USE OF CHLORINE FOR MUNICIPAL WATER SUPPLIES—(Continued from page 439).

City and State	Population 1910	Population 1918	Began use of chlorine	Use discontinued	Other treatment	Deaths from Typhoid — Years Before Use of Chlorine 5	4	3	2	1	Years After Use of Chlorine 1	2	3	4	5
Vermont:															
Rutland	13,546	15,500	1910	No	None	4	2	0	0	2	1	1	1	1	5
Virginia:															
Martinsville	3,000	5,000	1916	No	Filtration	..	..	..	..	..	..	..	..	..	..
Newport News	22,500	75,000	1918	No	Filtration	..	..	..	4	3	..	..	..	..	..
Washington:															
Seattle	240,872	400,000	1915	No	None	33	24	20	14	19	10	18	9	..	..
West Virginia:															
**Elkins	5,500	7,000	1916	No	None	..	..	15	11	11	11	16	..	..	..
Wisconsin:															
Kenosha	22,000	36,000	1913	No	Filtration	..	13	5	11	8	6	1	2	5	2

*The corresponding deaths, deducting imported cases and t hose without city water on the premises, were 0, 5, 4, 3, 2, 2, 1, 3. †All figures for deaths for Michigan cities are in rates per 100, 000 of population. §Reduction in rate for this and the two following years was due to elimination of outside privies. ‡Typ hoid figures are death rates per 100,000. The entero-colitis rates for the same years were 412, 321, 207, 220, 80, 74, 61, 166. **Figures of deaths are for the entire county; those for the city are not kept separate. ††Due to milk epidemics. §§For one of eight sources of supplies in 1914; extended to all the others for over a year.

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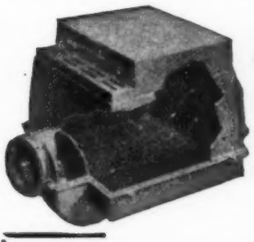

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